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EFFECTS OF FACILITY CONFIGURATIONS AND SCHEDULING TECHNIQUES ON AIRCRAFT THROUGHPUT FOR WARNER ROBINS ALC PAINT/DEPAINT FACILITIES

THESIS

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THESIS

Presented to the Faculty of the School of Engineering

of the Air Force Institute of Technology

Air University

In artial Fulfillment of the

Requirements for the Degree of

Master of Science in Operations Research

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March 1992

THESIS APPROVAL

STUDENT: Captain David V. McElveen CLASS: GOR-92M

THESIS TITLE: Effects of Facility Configurations and Scheduling Techniques on Aircraft Throughput for Warner Robins ALC Paint/Depaint Facilities

DEFENSE DATE: 3 March 1992

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Preface

The objective of this research was to determine the effects of configuration options and scheduling techniques on aircraft throughput on Warner Robins ALC paint/depaint facilities. This was accomplished by means of several computer simulation models with data collected from WR-ALC "field experts." The idea for this research came as a result of an simulation studies course at AFIT during the Summer of 1991, in which the WR-ALC C-141 maintenance system was investigated.

I wish to acknowledge those people that have provided assistance and guidence in preparing this thesis. First, a word of thanks to my advisors, Captains John Borsi and Wendell Simpson for their time and support throughout this research effort. Also, I would like to thank all those people at WR-ALC - In particular, Capt Dale Colter, Col Scoskie, and Denise Yawn - for providing all the data, providing the opportunity to tackle this real-world problem, and showing a genuine interest in the results. I would like to express my deepest gratitude to my wife, Darbie, for her sacrifices, far to many to mention here, continued support, and for providing assistance throughout this research.

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Abstract

The purpose of this research was to determine the effects of configuration options and dispatching techniques on aircraft throughput for the Warner Robins Air Logistics Center paint/depaint facilities. The primary measure of effectiveness used was aircraft throughput. A secondary measure of effectiveness, wait time, was also evaluated.

A simulation model was constructed and used for this analysis as the primary means to conduct the research. The model was modified to produce a series of runs within an experimental design consisting of factors for configuration option and dispatching rules. The alternative facility configurations were defined by management at WR-ALC. The dispatching rules considered were first come first served (FCFS), largest number in queue (LNQ), shortest processing time (SPT), and a look ahead heuristic (AHEAD)

Due to a reduction in the number of paint aircraft, no configuration option differing from the baseline significantly affected aircraft throughput. Dispatching rules were also found to produce no significant differences on aircraft throughput.

Configuration options were found to produce significant differences in wait time. Only when the proportion of aircraft requiring paint was increased did the shortest processing time dispatching rule produce

significant and important differences in aircraft wait times.

EFFECTS OF FACILITY CONFIGURATIONS AND SCHEDULING TECHNIQUES ON AIRCRAFT THROUGHPUT FOR WARNER ROBINS ALC PAINT/DEPAINT FACILITIES

I. Introduction

1.1 Background

Warner Robins Air Logistics Center (WR-ALC), at Robins Air Force Base, Georgia, is the main depot for C-141 and C-130 aircraft. These aircraft undergo various maintenance procedures at WR-ALC throughout their lifecycle including periodic scheduled maintenance, implementation of aircraft modifications, and unscheduled maintenance necessary to return an aircraft to an airworthy condition.

For C-141 aircraft, the primary maintenance requirements include speedline inspections, programmed depot maintenance, and a replacement of the center wing box. The speedline procedure involves the inspection of the wings and fuel cells for stress fractures and cracks and repairing any found. Programmed depot maintenance (PDM) is the routine preventative maintenance performed on the aircraft throughout its lifecycle.

Due to the extended life of the C-141 aircraft, wing cracks have developed along the main wing root of a number of C-141 airframes. To correct the situation, the center

wing box is replaced. The center wing box replacement involves first, removing the wings from the fuselage, then removing the existing wing box, installing a new wing box, and finally, re-joining the wings to the fuselage.

Maintenance for C-130 aircraft includes speedline inspections and PDM performed in a similar manner to that of the C-141 aircraft described above. C-130 aircraft may also require modifications while at WR-ALC which may include upgrades their electrical system and/or support structure of the airframe [Yawn, 1992].

In conjunction with these maintenance procedures, all C-130 aircraft and the majority of the C-141 aircraft arriving at WR-ALC undergo a paint/depaint process to remove existing corrosion, protect the aircraft from future corrosion, and provide an improved appearance.

1.2 Paint/Depaint Operations

The basic flow of aircraft that are to be repainted includes first, depainting the aircraft, followed by completion of the required maintenance procedures. After maintenance has been completed and the aircraft has been reassembled, aircraft undergo a wash, etch and alodine (W/E/A) treatment to clean the surfaces and prepare them to receive the paint. The final step is to repainting the aircraft. A portion of the C-130 aircraft requiring

repainting will undergo a limited version of this process. These C-130 aircraft are referred to as scuff sanded aircraft. A scuff sanded C-130 aircraft is subjected to an initial wash process, followed by completion of required maintenance, an outgoing wash, and a limited depaint and paint procedure. The flows for aircraft to be repainted are shown in Figure 1.1.

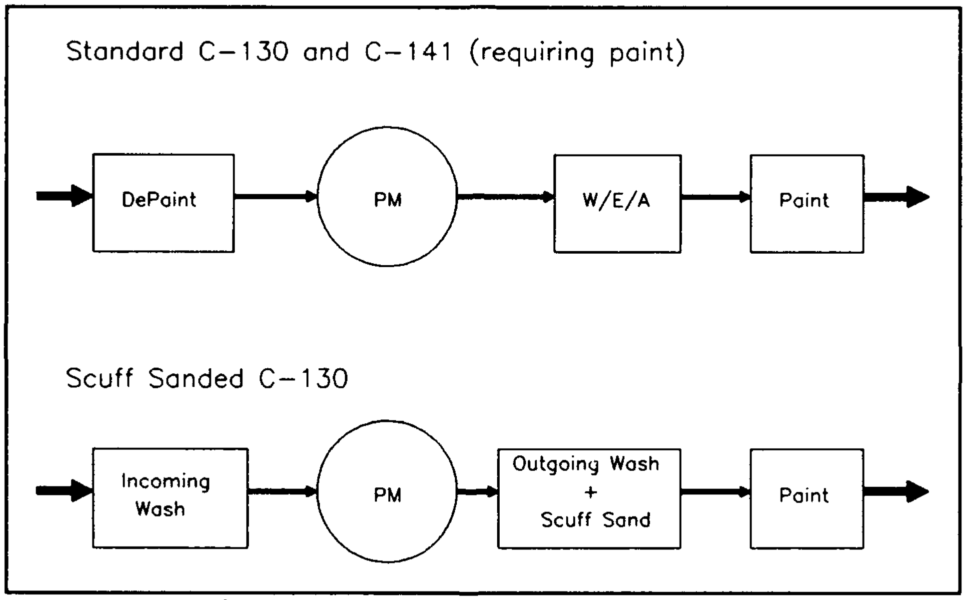


Figure 1.1 Paint/Depaint Flow

To depaint a C-141 aircraft, the aircraft is coated with a chemical solvent which strips the paint from the airframe. Current depaint procedures for C-130 aircraft, other than those which are scuff sanded, require these aircraft to be depainted by a process known as media blasting. This procedure uses high pressurized sprayers to

project small beads of plastic onto the surface of an aircraft to physically remove the paint. This procedure has proven to be less harsh to the skin of the aircraft, however, the disadvantage is an increase in required processing time. Scuff sanded C-130 aircraft, as opposed to standard C-130 aircraft, are not depainted. These aircraft require sanding down of the existing paint on the airframe with the use of sanding disks. This sanding process is referred to as scuff sanding and is required to prepare the aircraft to properly receive the paint.

The wash, etch and alodine (W/E/A) process removes any existing corrosion from the aircraft, provides protection from future corrosion, and prepares the skin to receive the paint. As shown in Figure 1.1, scuff sanded aircraft only undergo the wash portion of this process. Scuff sanded C-130s are washed prior to, and at the conclusion of required maintenance.

The final process of the paint/depaint process is repainting the aircraft. This process involves applying the paint as well as appropriate insignia and markings to the aircraft. Processing time required to paint an aircraft differ for each type of aircraft due to their differences in size (C-141 being larger and therefore requiring a longer time to paint). A scuff sanded aircraft requires only an overspray to repaint the aircraft.

Currently, WR-ALC has one hangar dedicated to the painting process and one hangar that must conduct both W/E/A and depaint operations. These hangars are currently responsible for painting and depainting of both aircraft types (C-141 and C-130). Construction of a new, modernized paint/depaint facility for the C-130 aircraft is currently underway at WR-ALC. This facility will be capable of performing each of the paint/depaint operations on an aircraft. Current plans are to dedicate this facility solely for C-130 aircraft; however, the potential exists for this to be expanded to C-141s.

Management has long considered the paint/depaint process as a bottleneck in the maintenance process at WR-ALC causing delays in returning these aircraft to their respective users. As part of "Proud MAC," WR-ALC may be tasked with repainting a large portion of the C-141 and C-130 aircraft with new paint schemes within the next three years [Davis, 1991]. Obviously, this will add additional pressure on the paint/depaint facilities.

The potential for an increase in future demands on the WR-ALC maintenance process necessitates reducing or eliminating the paint/depaint and other bottlenecks within the system to achieve aircraft throughput requirements.

This research will focus on removing the paint/depaint process as a system bottleneck.

One possible alternative to alleviate the paint/depaint bottleneck is to contract out the painting and depainting of a portion of these aircraft to capable contractors. This option would increase the cost of maintaining these aircraft and is therefore an undesirable option. A second and possibly more economic option is to better utilize the existing facilities at WR-ALC. WR-ALC management has identified these possible ways to improve the utilization of the facilities: reconfigure the paint/depaint facilities, adjust dispatching rules which control the order that waiting aircraft enter the facilities, or allow preemption of aircraft being processed to allow higher priority aircraft to use a facility.

1.3 Paint/Depaint Facility Configurations

As discussed above, only two facilities are currently available to perform all paint/depaint operations. With the addition of the new, modernized facility, delays associated with paint/depaint operations should be decreased. The extent to which these delays will be reduced is uncertain and it is unknown if the paint/depaint bottleneck will be eliminated as a result of this increase in capability.

The management policy on how these facilities are utilized may also affect aircraft throughput. As described above, current plans are to use the new paint/depaint facility solely for C-130 aircraft. The impact of using this facility as dedicated or non-dedicated (for both C-130 and C-141 aircraft) on aircraft throughput has not been examined and may be significant.

In addition to management policy changes, the effects of increasing the capabilities of the existing facilities on aircraft throughput is uncertain. It may be possible, for example, to increase the capability of the current paint facility to include the W/E/A process.

The effects of these possible changes in either one or both policy and capabilities of the paint/depaint facilities on aircraft throughput is uncertain. Examples of possible configuration options are shown in Table 1.1.

1.4 Dispatching Rules

When more than one aircraft is waiting for the same paint/depaint operation a decision must be made on which aircraft will undergo the operation first. This decision will be considered as a dispatching rule. The effects of alternate dispatching rules have not been investigated in past research for WR-ALC and could have an impact on aircraft throughput. The current dispatching rule used for

the paint/depaint facilities focuses primarily on the number and type of aircraft waiting to be processed.

Table 1.1

Example Configuration Options

Bldg	for C-141 AC Depaint	for C-141 AC W/E/A	for C-141 AC Paint	for C-130 AC Wash	for C-130 AC Depaint	for C-130 AC W/E/A	for C-130 AC Paint
Current Configuration							
54	Yes	Yes	No	Yes	Yes	Yes	No
89	No	No	Yes	No	No	No	Yes
Facilities Dedicated							
54	Yes	Yes	No	Yes	Yes	Yes	No
89	No	No	Yes	No	No	No	Yes
50	No	No	No	Yes	Yes	Yes	Yes
Facilities Non-Dedicated; modifications to builcings 54 & 89							
54	Yes	Yes	Yes	Yes	Yes	Yes	Yes
89	Yes	Yes	Yes	Yes	Yes	Yes	Yes
50	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Bldgs 54 and 89 are current hangars
Bldg 50 is new, modernized facility
W/E/A = Wash, Etch and Alodine (Preparation of AC for Paint)

Typically, aircraft at WR-ALC are serviced on a first come, first served basis. If more than one aircraft arrive concurrently, the dispatching decision is based on earliest scheduled due date if the aircraft are identical (i.e., both C-130s). If the aircraft are of different types (i.e., C-141 and C-130 arrive simultaneously) the dispatching decision is made after consultation with the respective

aircraft's organization. Factors such as current waiting time or job duration required for waiting aircraft are not considered within the current dispatching decision.

1.5 Preemption

One technique attempted by WR-ALC management to increase aircraft throughput is preempting, or breaking, an aircraft's processing. Under this technique, an aircraft in the process of W/E/A, incoming wash, or outgoing wash is preempted to allow an awaiting aircraft to undergo W/E/A, if the paint facility is available. The decision to preempt aircraft is based on the reduction in flow days for the preempting aircraft with no formal analysis conducted to determine the overall impact of this technique.

1.6 Specific Objective

The primary objective of this research is to determine the effects of configurations and dispatching techniques on aircraft throughput for the WR-ALC paint/depaint facilities.

1.7 Sub-Objectives

The sub-objectives of this research will include:

1. Research current scheduling procedures and practices at WR-ALC concentrating on the allocation of resources as well as determining the limiting resources and constraints of the system. Also, processing and operation times for the system will be collected.

2. Investigate different dispatching and preemption techniques to determine those which are most applicable to the WR-ALC system.

3. Identify alternative configuration options that are acceptable to WR-ALC management.

4. Determine a method to evaluate the effects of facility configuration options and dispatching techniques on aircraft throughput.

5. Determine if there exists a single dispatching technique for the paint/depaint facilities which maximizes aircraft throughput independent of facility configuration.

6. Determine the effects of aircraft preemption on aircraft throughput.

7. Determine an upper bound on capacity for paint/depaint facility throughput and determine facility utilization rates under each configuration option.

1.8 Plan of the Report

Chapter I provided an introduction to this research effort, including the background of the problem, characteristics of the system, the specific objectives of the research, and subsidiary problems. Chapter II provides a review of the literature to include scheduling theory and a discussion of simulation issues. Chapter III details the formulation of the model. Chapter IV describes the experimental design constructed and statistical significance testing used. Chapter V presents the results of the research, and Chapter VI summarize the results and detail the solutions to both the specific objective, and each sub-objective as well as providing recommendations for further research.

II. Literature Review

2.1 Introduction

The purpose of this chapter is to review the published results that apply to the analysis of the WR-ALC paint/depaint facility configurations and scheduling policies. Specific topics to be covered include scheduling theory, multiprocessor systems, preemption techniques, resource-constrained scheduling, and dispatching rules. The chapter concludes with a discussion of issues in simulation modeling.

2.2 Scheduling Theory

"Scheduling is the allocation of resources over time to perform a collection of tasks." [Baker, 1974:2]. One type of problem known as a sequencing problem is primarily concerned with the ordering of a set of operations on a given set of machines. A job is defined as a set of operations interrelated by precedence restrictions derived from technological constraints [Hax and Candea, 1984:259]. A machine is defined as a device or facility capable of performing a required operation. The WR-ALC problem falls within the sequencing category since the concern is the

ordering of aircraft as they enter each paint/depaint facility.

2.2.1 Flow Shop versus Job Shop. The system, or shop, containing the facilities or machines necessary to perform each operation is typically classified as a flow shop or a job shop. The distinction between a job shop and a flow shop is based on the sequence of machines used by each job. "A flow shop is one in which all the jobs follow essentially the same path from one machine to another" [Conway *et al*, 1967:7]. The ordering of machines used by each job in a job shop can be completely random. Although scheduling problems typically classify the shop into one of these categories, actual systems usually fall somewhere between these two definitions.

The WR-ALC paint/depaint system, or shop, falls somewhere between the flow shop and a completely random job shop definitions. Although the actual flow of operations is essentially the same (depaint, W/E/A, paint) the hangar, or machine, which performs the operation can vary depending on the configuration option investigated.

2.2.2 Arrival Process. Scheduling problems are further classified by how jobs arrive into the system. Within the reviewed literature, a static system is defined

as one in which the order and number of jobs is known and does not change over time. Also, in a static system, the system is assumed to be idle and immediately available to process the jobs. No further jobs are allowed to enter the system and therefore, priority is given to the known set of jobs. A dynamic system is defined as one in which jobs arrive over time according to a known or unknown statistical distribution [Conway, 1967:7]. Using these definitions, the WR-ALC system must be considered as dynamic. Due to the stochastic nature of the maintenance process, the arrival process at each paint/depaint facility is random. Dynamic scheduling problems have proven to be the most difficult to solve, typically requiring heuristic solution techniques [Baker, 1974:6]. Recent as well as past research has focused on the use of simulation to model the arrival rates and times for the dynamic process [Dumond and Mabert, 1988:107], [Baker, 1974:Ch 8]. Simulation is also widely used to investigate dynamic flow shops that contain stochastic processing times [Holloway and Nelson, 1974:1264-1272]. Although most past studies assume an arrival process as well as operation processing times following an exponential distribution, Baker concludes the nature of the arrival process or the service process is not critical in comparing scheduling rules [Baker, 1974:215].

2.2.3 Basic Model. Scheduling problems are also classified by the assumptions used to model the problem. The most simple and often studied type of job shop is the single machine job shop. "Each job has a single operation that is to be performed on the single machine existing in the shop" [Hax and Candea, 1984:266]. Much of the research work has been conducted on the basic process with the following assumptions:

> 1. Each machine is continuously available for assignment, without significant division of the time scale into shifts or days, and without consideration of temporary unavailability for causes such as breakdown or maintenance.
>
> 2. Jobs are strictly-ordered sequences of operations.
>
> 3. Each operation can be performed by only one machine in the shop.
>
> 4. There is only one machine of each type in the shop.
>
> 5. Preemption is not allowed-once an operation is started on a machine, it must be completed before another operation can begin on that machine.
>
> 6. The processing-times of successive operations of a particular job may not be overlapped. A job can be in process on at most one operation at a time.
>
> 7. Each machine can handle at most one operation at a time. [Conway *et al*, 1967:5-6]

Although this model does not completely represent the paint/depaint facilities at WR-ALC, it will be used as the basic building block from which a model representative of

the WR-ALC system will be developed. Further refinement of these assumptions will be discussed as part of this review.

2.2.4 Multiprocessor (parallel machine) shop. The number and configuration of machines within the shop factor into the classification of scheduling problems. For this research, both the number and configuration of the paint/depaint facilities will be altered to determine the impact on aircraft throughput. Several of the configuration options will consider more than one machine (hangar) performing the same operation (i.e., painting). Therefore, assumption 3 of the basic model must be relaxed. The possible configuration options will include a three parallel machine system in which all hangars are nondedicated, or available to perform all operations (paint, depaint, W/E/A, and C-130 Wash). A review of the literature on multiprocessor shops shows the studies to be very specific, with none found to be directly transferable to this system. Past research has been applied primarily to systems with identical parallel machines. Horn [Horn, 1974:177-185] provides a technique to reduce the mean flow time problem to a linear assignment problem, but this research is only applicable to an identical machine system. In the WR-ALC system, the new facilities has a longer processing time for depaint then do the current facilities. Also, facility

capabilities will vary dependent upon investigated configuration option.

2.2.5 Preemption Techniques. Due to possible allowance for preemption, assumption 5 of the basic model will be relaxed. Cho and Sahni [Cho and Sahni, 1978:197-199] demonstrate the increased complexity for models containing this assumption.

Two types of preemption techniques have been described throughout the literature. These techniques are preempt-resume and preempt-repeat [Conway *et al*, 1967:67]. In terms of this system, the preempt repeat discipline can be related to an aircraft being preempted from an operation for an aircraft of higher priority. After the higher priority aircraft has completed its operation, service on the preempted aircraft will start over with no credit for the earlier processing. In the preempt-resume discipline, the preempted aircraft will return and processing time will pick up from the time of the preemption. The preemption technique at WR-ALC, as with most systems, falls somewhere between the preempt-resume and preempt repeat disciplines.

At WR-ALC, the past preemption rules allowed for an aircraft being depainted, or one being washed, to be preempted by an aircraft requiring W/E/A if the paint facility is available. Typically 8 hours of processing time

will be lost for the preempted aircraft, and if the aircraft remains preempted for more than 48 hours, the depaint process must go through W/E/A again due to the chemicals used in the depaint process. This 8 hours of incurred delay time is not considered in either the preempt-resume or preempt-repeat disciplines. Schrage [Schrage, 1972:668-677] provides an implicit enumeration algorithm for solving resource-constrained problems allowing for preemption-resume discipline. One criteria for this research is to minimize project length. Schrage concludes that for the cases examined in this study, allowance for preemption does not dramatically decrease minimum or maximum completion times [Schrage, 1972:676].

2.2.6 Resource Constraints. As described in Chapter I, WR-ALC is responsible for performing several types of maintenance procedures on arriving aircraft. A large portion of these aircraft require the usage of the paint/depaint facilities. With several types of aircraft competing for the use of a fixed number of paint/depaint facilities, the system is subject to resource constraints. Although resource constraints are typically applied to project scheduling problems, the concept of resource constraints is applicable to the WR-ALC problem. Past research has presented a conceptual mathematical programming

formulation to gain insight into the resource constrained scheduling problem [Talbot and Patterson, 1978:1163-1174]. A very valuable tool used to adequately model the flow shop subject to these types of resource constraints is computer simulation. Most simulation software language capable of modeling the use of resources as well as providing priority options on how to allocate resources [Pritsker, 1986:Ch 1].

2.2.7 Dispatching Rules. For the WR-ALC paint/depaint system, as aircraft arrive at the paint/depaint facilities, queues will develop. The rule used to select one of the awaiting aircraft to enter the next available facility is defined as a dispatching rule. Over 100 such dispatching rules have been defined by Panwalker and Islander [Panwalker and Islander, 1977:45-61]. The dispatching rules that appear to have applications to this research include shortest processing time (SPT), largest processing times (LPT), first come first served (FCFS), expected due date (EDD), shortest remaining processing time (SRPT), and largest remaining processing time (LRPT). One of the most popular of these dispatching rules, SPT, has been found to work well for a large number of scheduling problems and measures of effectiveness.

Many simulation studies have been conducted to examine the effects of different dispatching techniques on various

scheduling criteria such as flow time, lateness, and missed due dates. WR-ALC has requested the measure of effectiveness for this research to be aircraft throughput, or number of aircraft completing the system over a specified period of time. Although no simulation study reviewed specifically addressed throughput as the criteria, other factors can be examined which do have an impact on aircraft throughput. For example, Conway describes a theoretical example of an Air Force maintenance shop. He states that management should be interested in scheduling to minimize the number of jobs in the maintenance system since this should maximize the number of aircraft available for service [Conway *et al*, 1967:14].

Baker references the minimization of flowtime, or time in system, in order to optimize most criteria. Time in system is an important measurement from the using command's standpoint, determining when the aircraft can be returned to service. In addition, Kan provides a proof demonstrating that, in general, maximizing the ratio of mean completion time over maximum completion time is equivalent to maximizing expected throughput for a given time interval [Kan, 1976:23]. These measurements will be collected, however maximizing aircraft throughput will remain the primary measure of effectiveness.

2.3 Simulation

Throughout the literature, a common tool used to investigate scheduling problems is computer simulation. To conduct a simulation analysis, Pritsker points out the following ten stages of analysis development which have been followed in this research effort:

> 1. Problem Formulation - The definition of the problem to be studied including a statement of the problem-solving objective.
>
> 2. Model Building - The abstraction of the system into mathematical, logical relationships in accordance with the problem formulation.
>
> 3. Data Acquisition - The identification, specification, and collection of data.
>
> 4. Model Translation - The preparation of the model for computer processing.
>
> 5. Verification - The process of establishing that the computer program executes as intended.
>
> 6. Validation - The process of establishing that the simulation model accurately represents the real system to the degree necessary to draw valid inferences.
>
> 7. Strategic and Tactical Planning - The process of establishing the experimental conditions for using the model.
>
> 8. Experimentation - The execution of the simulation model to obtain output values.
>
> 9. Analysis of Results - The process of analyzing the simulation outputs to draw inferences and make recommendations for problem resolution.
>
> 10. Implementation and Documentation - The process of implementing decision results from the simulation and documenting the model and its use. [Pritsker, 1986:10-11]

The areas of verification and validation are of great importance to any research effort. Obviously, if the model is not accurate, or the results are not representative of the system, conclusions are of no significance. Verification techniques which are useful include the use of degenerative tests [Sargent, 1987:33] in which portions of the model are removed to determine the impact on other sections of the model. Also input values can be modified and a comparison made between expected analytical results and simulation results. To validate that the simulation model adequately represents the true system, a structured walk-through of the model is conducted with key personnel familiar with the actual system [Law and McComas, 1990:51]. This walk-through will ensure the flow of the model is accurate as well as provide a consensus of operation times for each task within the system.

2.4 Chapter Summary

The primary purpose of this literature review was to find applicable techniques and models that could be applied to modeling the WR-ALC paint/depaint facilities. Although past research captured specific characteristics of this system, none could be found that captured them all. Since this system involves dynamic inputs, stochastic processing times, allowed preemption, and resource constraints,

simulation modeling has been used to evaluate the given paint/depaint facility configuration options and commonly used dispatching rules on aircraft throughput at WR-ALC.

III. Model Formulation

To evaluate the effects of aircraft throughput, a simulation of the aircraft flow at Warner Robins Air Logistics Center, WR-ALC, has been used to evaluate five paint/depaint facility configuration options and several dispatching rules. Simulation was chosen based on its capabilities for handling the randomness of the system, as well as the complex interactions between resources and aircraft flows. The dispatching rules are broken down into dispatching rules for aircraft entering a facility, and dispatching rules for facility utilization. Aircraft dispatching rules include first come first served (FCFS), a look ahead heuristic (AHEAD), largest number in queue (LNQ), and shortest processing time (SPT). Dispatching rules for facility utilization are based on first freed (FF) and minimum utilization (MINU). These dispatching rules will be described in detail in Section 3.3.6. The throughput goal is 235 aircraft (191 C-141s and 44 C-130s) over the two year period covering FY92 and FY93.

This chapter will describe the model, the flow of aircraft through WR-ALC, the assumptions used for this research, and the verification and validation techniques used for the simulation model.

3.1 Simulation Language

To determine the effects of configuration options and dispatching rules on aircraft throughput, simulation was chosen as the evaluation tool. Simulation was chosen based on its capability for handling the dynamic characteristics of the arrival process. In addition, simulation is capable of representing the complex interactions between resources and aircraft flows, which standard analytical techniques could not. The simulation language chosen to construct the model is SLAM II [Pritsker, 1986: Ch 1]. SLAM II was used with discrete event orientation to construct the models for this research due to its flexibility for exploring alternate configurations, as well as providing appropriate output. Discrete event systems simulation is defined as "the modeling of systems in which the state variables change only at a discrete set of points in time and not continuously over time [Banks, 1984:11]." Activity durations for the simulation model are assumed to be triangularly distributed with median, high and low values gathered from appropriate "field experts" at WR-ALC. These field experts vary from front line supervisors to management personnel.

3.2 Aircraft Flow

Although WR-ALC is responsible for C-130, C-141, and F-15 aircraft, only the flows for C-130 and C-141 aircraft

are considered. F-15 aircraft are not considered due to the anticipated construction of their own independent paint/depaint facilities. Aircraft arriving at WR-ALC undergo several possible maintenance procedures discussed in the following sections. In total, 235 C-130 and C-141 aircraft are expected to complete the system over the next two years.

3.2.1 C-141 Aircraft Maintenance Flow. The types of C-141 maintenance which WR-ALC performs, are as follows:

Speedline: TCTO 773. Inspection of wings for cracks and repairing those found. Replacement of beam cap at joint of wing if necessary.

Programmed Depot Maintenance (PDM): Routine preventative maintenance performed periodically on each aircraft over its lifecycle.

Center Wing Box Replacement: After the aircraft's fuselage is separated from the wings, a complete replacement of the center wing box is conducted.

Build-Up: Rewiring and re-assembly of the aircraft after completion of maintenance.

Functional Test: Complete testing (on ground and flight testing) of the aircraft after maintenance and build-up.

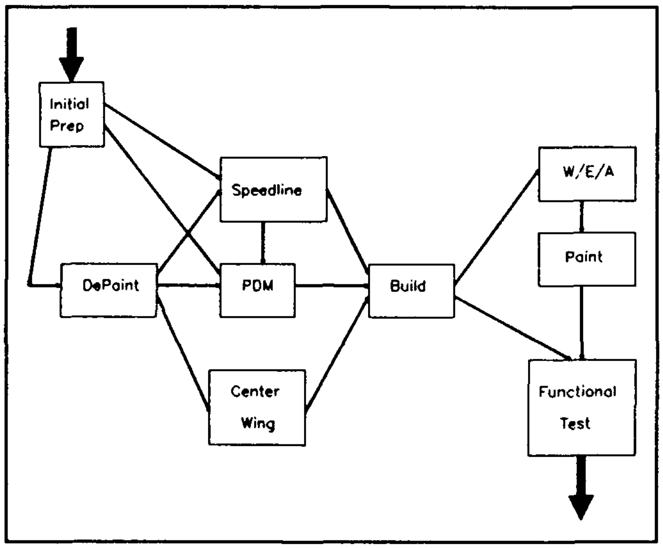
DePaint: Process of removing paint from the aircraft (chemical).

Wash, Etch and Alodine (W/E/A): Process for corrosion control and prevention as well as preparing the skin of the aircraft to receive paint.

Paint: Process of painting the aircraft and applying appropriate markings.

Figure 3.1 provides a graphical representation of the flow of C-141 aircraft. Table 3.1 details C-141 aircraft flow as well as each type of processing will be referred to throughout this thesis. All aircraft go through initial prep and functional test, so these steps are omitted from Table 3.1.

Figure 3.1 C-141 Flow



The throughput goal for each type of C-141 aircraft is shown in Table 3.2, where "Number" is the amount of aircraft scheduled. All aircraft flows begin in FY92 and end after FY93.

Table 3.1 C-141 Maintenance Designations

Type	Actual Flow (excluding Initial Prep and Functional Test)
SL	Speedline, Build-up
SL-Paint	DePaint, Speedline, Build-up, W/E/A, Paint
SL-PDM	Speedline, PDM, Build-up
SL-PDM-Paint	DePaint, Speedline, PDM, Build-up, W/E/A, Paint
CW Box	Depaint, Center Wing Box Replacement, Build-up, W/E/A, Paint
PDM	PDM, Build-up
PDM-Paint	DePaint, PDM, Build-up, W/E/A, Paint

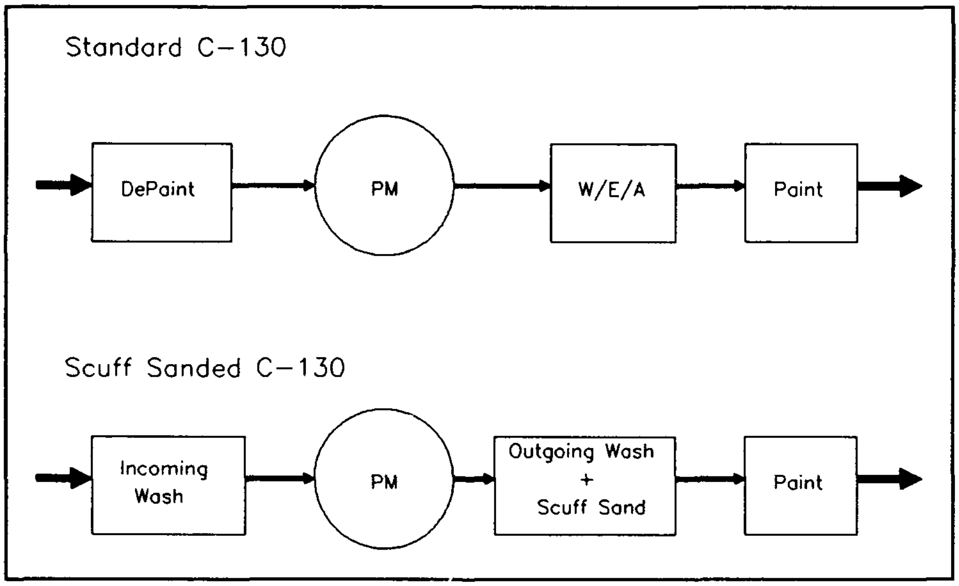
Table 3.2 C-141 Throughput Goals

Type	Number
SL	81
SL-Paint	33
SL-PDM	9
SL-PDM-Paint	46
CW Box	8
Total C-141 AC:	191

3.2.2 C-130 Maintenance Flow. Although detailed maintenance tasks for C-130 aircraft were not provided, C-130 aircraft are divided into two possible flow types; standard C-130, and scuff sanded C-130 aircraft. A standard

C-130 will be defined as a C-130 aircraft requiring a standard depaint process, followed by its required maintenance tasks, W/E/A, and finally paint. A scuff sanded C-130 will require tasks in the following order: incoming wash, required maintenance, outgoing wash, scuff sand, paint. The scuff sanding will occur during the outgoing wash process for the scuff sanded C-130. Figure 3.2 graphically depicts the two possible C-130 flows.

Figure 3.2 C-130 Flow



The data provided for C-130 maintenance duration (excluding Paint/Depaint times) were a minimum of 70 days, a median of 80 days, and a maximum of 90 days. The expected number of C-130 aircraft to complete the system is 22 per

year for the next four years. The breakout for number and type of C-130 aircraft per year is shown in Table 3.3.

Table 3.3 C-130 Throughput Goals

Standard C-130:	15 AC/yr
Scuff Sanded C-130:	7 AC/yr
Total C-130 AC	22 AC/yr

3.3 Description of Simulation Model

The simulation model used to compare the different configuration options is a simplified version of a model produced as a result of an independent study course conducted at the Air Force Institute of Technology in the Summer of 1991. Recent changes in policy at WR-ALC, modification of anticipated workload, and updates to activity duration due to a higher quality in worker performance resulted in the need for additional modifications to the model. The incorporation of paint/depaint facility configuration options also required modifications to the model.

3.3.1 System Constraints. Constraints for the model include facilities and overall number of aircraft on ground. These constraints are described below.

3.3.1.1 Facility Constraints. These constraints are based on facility limitations as well as manpower levels. The system is limited by number of paint/depaint facilities: 1 each of Bldgs 50, 54, and 89; PDM positions: C-130 (7 slots), and C-141 (8 slots); and Mate/Demate facilities (to remove and reinstall wings of C-141 aircraft requiring center wing replacement): 1 position. Also, the number of speedline positions is limited by the available hangar space. Currently 6 positions are available for SL and by 1 APR 93, additional hangars will be constructed increasing the number of SL hangar positions to 8, and constructing 11 SL-PDM positions.

The model assumes manpower levels are available to adequately staff each available maintenance position. For current capabilities, this assumption is valid, however as new facilities are constructed (in particular C-141 speedline hangars), additional manpower resources may be required.

3.3.1.2 Maximum Number of Aircraft on Ground (MOG) Constraints. The system is further constrained by the number of aircraft allowed on the ground at any given time. These MOG constraints are based on MAC policy requiring a minimum number of aircraft to be in service at all times.

As provided from WR-ALC management, the MOG constraint for C-141 aircraft is 35 aircraft, and 9 for C-130 aircraft.

3.3.2 Arrival Process. With changes in aircraft throughput requirements at WR-ALC, an exact input schedule was not available. Therefore, for purposes of this research, two types of arrival processes are examined. The first arrival process to be examined will assume an exponentially distributed aircraft arrival rate, with the mean determined by output requirements. This arrival rate will serve as a "best-guess" estimate of the actual input schedule.

The second arrival process considered will assume all aircraft are available to enter the system at t=0. Although the arrival process assumes all aircraft are available, the maximum number of aircraft on the ground (MOG) constraints based on aircraft type and maintenance requirements will limit the input flow of aircraft into the system. This arrival process will be used to determine an approximate upperbound on system throughput capacity.

3.3.3 Warm-up of System. To provide a realistic warm-up period for the system, aircraft were placed at various points within the system at the start of each simulation run. The aircraft initially entered into the system are

shown in Table 3.4. The location and number of the warm-up aircraft were verified by WR-ALC management [Colter and Scoskie, 1992].

Table 3.4 Input Location for Warm-Up Aircraft

Type Aircraft (#)	Location
Standard C-130 (2)	C-130 PDM
Scuff Sanded C-130 (1)	Incoming Wash
SL C-141 (1)	Speedline
SL C-141 (1)	Build-up
SL C-141 (1)	W/E/A
SL-Paint C-141 (1)	Depaint
SL-PDM-Paint C-141 (1)	PDM
SL-PDM-Paint C-141 (1)	Functional Test
CW Box (1)	Center Wing
SL-PDM (1)	Speedline

In addition to an initial warm-up, additional aircraft are inserted into the model to maintain pressure on the paint/depaint facilities after all scheduled aircraft have entered the system. For this period, aircraft begin arrival at beginning of FY94. The model assumes an exponentially distributed arrival process with means appropriate to mirror FY93 inputs. Listed below are these additional aircraft types along with mean time between arrivals (MTBA):

Table 3.5 Additional Aircraft

Aircraft Type	MTBA (days)
Standard C-130	23.6
Scuff Sanded C-130	50.6
CW Box	70.8
SL	7.5
SL-Paint	18.2

3.3.4 Queues for aircraft awaiting Paint/Depaint Operation. As aircraft arrive requiring a paint/depaint operation, if all facilities are busy the aircraft will enter a queue associated with the required operation. When an aircraft is selected to enter a facility (after facility has been freed) it is transferred from the operation queue to a queue associated with one of the paint/depaint facilities. The selection criteria for an aircraft to enter the facility is based on the dispatching rule under investigation. The facility queue is required when more than one facility is capable of performing the required operation. An aircraft will enter these queues only when the corresponding facility is free. Therefore, every aircraft in the facility queue is waiting for service. An exception to this rule will be for aircraft just completing W/E/A. An aircraft has only 48 hours to be painted after concluding W/E/A. To stay within this constraint, aircraft completing W/E/A will be given highest priority to enter the next available paint facility.

3.3.5 Configuration Options. The primary objective of this research is to examine the capabilities of several paint/depaint facility configuration options. The configurations were chosen based on WR-ALC requests. These configuration options represent configuration options ranging from a baseline (Option 1), current configuration (Option 2), two configurations based on changes in policy at WR-ALC (Option 3 and Option 5), and a configuration option based on change in policy as well as upgrades in capabilities of the facilities (Option 6). It should be noted, no configuration option 4 exists. This option was reserved for a possible configuration option which, after discussions with WR-ALC management, was determined to not be worthy of consideration for this research. Those configuration options considered are as follows:

Configuration Option #1: This configuration option represents the configuration of the paint/depaint facilities prior to the existence of Building 50 (modernized C-130 paint/depaint facility). All aircraft requiring paint utilize buildings 54 and 89 for all paint/depaint operations. The model assumes both C-130 and C-141 aircraft are chemically depainted. Table 3.6 provides an illustration of this configuration option.

Table 3.6 Configuration Option #1

Bldg	for C-141 AC Depaint	W/E/A	Paint	for C-130 AC Wash	Depaint	W/E/A	Paint
54	Yes	Yes	No	Yes	Yes	Yes	No
89	No	No	Yes	No	No	No	Yes

Configuration Option #2: This paint/depaint facility configuration option brings Building 50 into operation. All C-141 paint/depaint operations utilize Buildings 54 and 89, and all C-130 aircraft utilize Building 50. C-130 aircraft now undergo a media blast depaint procedure as opposed to C-141 undergoing a chemical depaint procedure. This configuration option is the current facility configuration at WR-ALC. Table 3.7 presents Configuration Option #2.

Table 3.7 Configuration Option #2

Bldg	for C-141 AC Depaint	W/E/A	Paint	for C-130 AC Wash	Depaint	W/E/A	Paint
54	Yes	Yes	No	No	No	No	No
89	No	No	Yes	No	No	No	No
50	No	No	No	Yes	Yes	Yes	Yes

Configuration Option #3: This configuration option utilizes Building 50 to W/E/A and/or Paint C-141 aircraft

only when Building 89 is occupied and Building 50 is free. Table 3.8 presents Configuration option 3.

Table 3.8 Configuration Option #3

Bldg	for C-141 AC Depaint	W/E/A	Paint	for C-130 AC Wash	Depaint	W/E/A	Paint
54	Yes	Yes	No	No	No	No	No
89	No	No	Yes	No	No	No	No
50	No	No*	No*	Yes	Yes	Yes	Yes

* Building 50 will W/E/A and/or Paint a C-141 if 89 is busy and 50 is free

Configuration Option #5: This configuration option utilizes building 50, 54, and 89 independent of aircraft type. For depaint, building 50 is not capable of performing a chemical depaint, and therefore, will not be used for this operation. The model also assumes building 54 will not be utilized to depaint a C-130 aircraft. Table 3.9 presents configuration option 5.

Table 3.9 Configuration Option #5

Bldg	for C-141 AC Depaint	W/E/A	Paint	for C-130 AC Wash	Depaint	W/E/A	Paint
54	Yes	Yes	No	Yes	No	Yes	No
89	No	No	Yes	No	No	No	Yes
50	No	Yes	Yes	Yes	Yes	Yes	Yes

Configuration Option #6: This configuration option utilizes Building 50, 54, and 89 independent of aircraft type, as well as allowing for an increase in capabilities for Buildings 54 and 89. The model assumes building 54 is now capable of painting operations, and building 89 is capable of performing wash, depaint, and W/E/A operations. Table 3.10 presents configuration option 6.

Table 3.10 Configuration Option #6

Bldg	for C-141 AC Depaint	W/E/A	Paint	for C-130 AC Wash	Depaint	W/E/A	Paint
54	Yes	Yes	Yes	Yes	Yes	Yes	Yes
89	Yes	Yes	Yes	Yes	Yes	Yes	Yes
50	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Due to increases in paint/depaint facility capability and flexibility, it was expected that aircraft throughput

would increase as configuration option number increases. Similarly, wait times were expected to decrease as configuration option number increases. As an aircraft arrives for a paint/depaint process within the simulation coding, it is marked to designate which facility(ies) is/are capable of performing its required procedure. By altering this "need" variable, alternate configuration options are modeled.

3.3.6 Dispatching Rules for Aircraft entering Paint/Depaint Facility. Besides configuration options, dispatching rules for entering each paint/depaint facility were analyzed. When a facility has been freed, the appropriate subroutine will be called to determine which, if any, awaiting aircraft will be brought into the facility specified by the rules of the applied dispatching technique. If all awaiting aircraft require a facility other than the freed facility, no aircraft will enter the facility.

The dispatching techniques chosen were based on dispatching rules or modifications to those rules found within the literature review and found to be appropriate and/or applicable to the WR-ALC system (as verified by WR-ALC management). The following paragraphs define the dispatching techniques explored. Figure 3.3 provides a flow chart representation of these dispatching techniques

3.3.6.1 First Come First Served (FCFS) Dispatching Rule. The first dispatching technique explored is FCFS. The rationale for selection of this dispatching rule is its similarity to the current dispatching techniques used at WR-ALC. This technique queries each awaiting aircraft to decide first if the available building is capable of performing the required operation, and finally determining which of these aircraft has been waiting the longest amount of time. FCFS is the current dispatching technique utilized at WR-ALC in most occasions.

3.3.6.2 Shortest Processing Time (SPT) Dispatching Rule. After a facility has been freed, a sort will be made of aircraft waiting for a specific paint/depaint operation (Wash, Depaint, W/E/A, or Paint) in order of smallest to largest expected processing times. Ties will be broken based on longest waiting time. This dispatching rule is examined due to its robustness in optimizing numerous criteria as found throughout the literature review [Baker, 1974:Ch 8] [Conway *et al*, 1967: Ch 11]. Table 3.11 and Table 3.12 lists the dispatching priorities for configuration options 1, 3, and 5 for building 50 and 54 respectively, and Table 3.13 shows the dispatching priorities for configuration option 6.

Figure 3.3 Dispatching Rule for Freed Facility

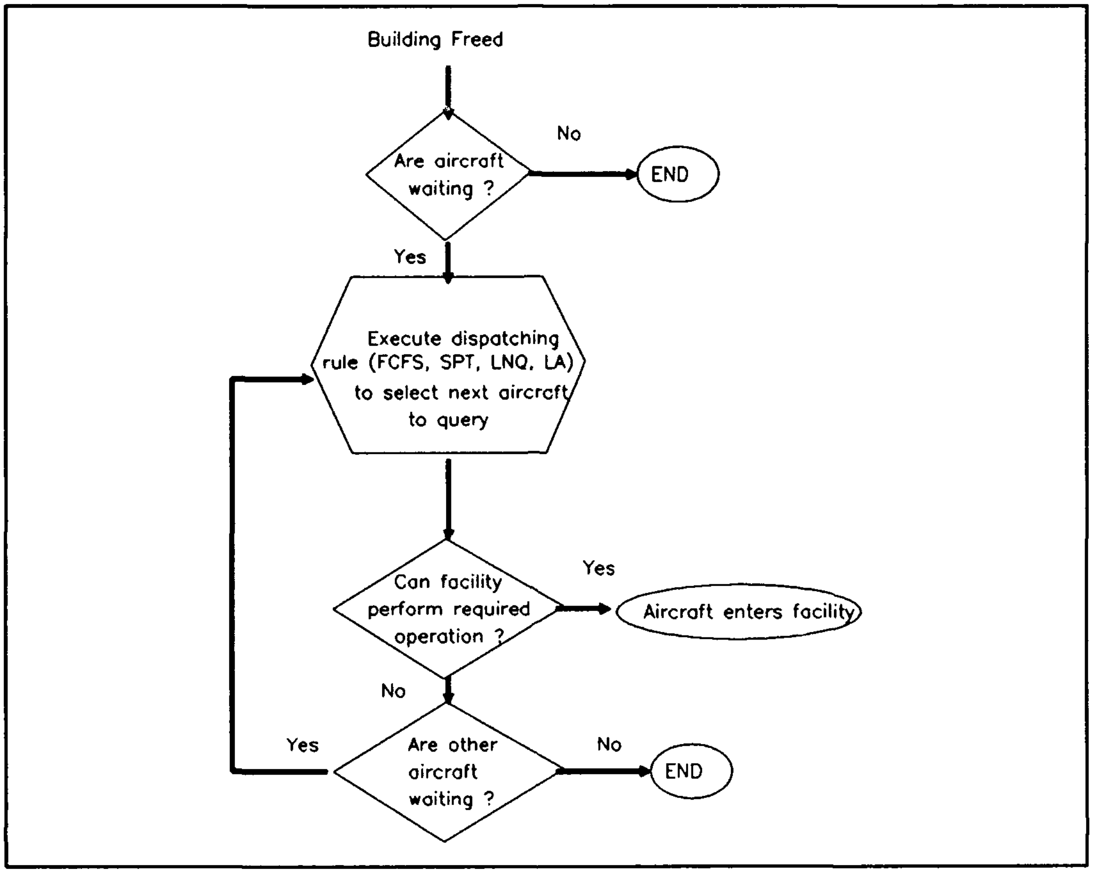


Table 3.11 Building 50 SPT Order
Configuration Options 1, 3, or 5

Bldg 50 (Configuration Options: 1, 3, 5)	Time (days)
1. Paint C-141	4.0*
2. C-130 Incoming Wash	0.65
3. W/E/A C-141	1.0
4. Outgoing Wash & Scuff Sand C-130	1.3
5. Paint Scuff Sanded C-130	1.5
6. W/E/A & Paint Standard C-130	4.0
7. DePaint C-130 (Media Blast)	10.0

Table 3.12 Building 54 & 89 SPT Order
Configuration Options 1, 3, or 5

Bldg 50 (Configuration Options: 1, 3, 5)	Time (days)
1. Paint Standard C-130	3.0*
2. Paint C-141	4.0*
3. C-130 Wash	0.65
4. W/E/A C-130 or C-141	1.0
5. Outgoing Wash & Scuff Sand C-130	1.3
6. Paint Scuff Sanded C-130	1.5
7. DePaint C-130 (Chemical)	3.0
8. DePaint C-141 (Chemical)	4.0

* Paint C-141 and C-130 are given highest priority due to maximum 2 days wait constraint after W/E/A.

Table 3.13 Building 50, 54, & 89 SPT Order
Configuration Option 6

Bldg 50 (Configuration Option: 6)	Time (days)
1. C-130 Incoming Wash	0.65
2. Outgoing Wash & Scuff Sand C-130	1.3
3. Paint Scuff Sanded C-130	1.5
4. DePaint C-141 (Chemical)	3.0
5. W/E/A & Paint Standard C-130	4.0
6. W/E/A & Paint C-141	5.0
7. DePaint C-130 (Media Blast)	10.0

3.3.6.3 Largest Number In Queue (LNQ) Dispatching Rule. In an effort to minimize paint/depaint wait times, the third dispatching rule examined is a LNQ technique. For this dispatching rule, when a paint/depaint facility becomes free, it will search the queues in front of each paint/depaint process (Wash, DePaint, W/E/A, and Paint). The order of search will be determined by decreasing order

of number of aircraft waiting for the specific process. The largest queue will be queried first and the aircraft waiting the longest amount of time with a need for the freed facility is selected for service.

3.3.6.4 Look Ahead (AHEAD) Dispatching Rule. The look ahead dispatching rule, AHEAD, is similar in approach to the LNQ dispatching rule discussed in Section 3.3.6.3. With more than one aircraft waiting for a freed facility, the aircraft with the smallest queue size at its next required operation is selected. The aircraft with the shortest "look ahead" queue will be allowed into the freed facility next. The tie breaking criterion will be based on longest current wait time. This dispatching rule is based on the look ahead dispatching rule discussed by Panwalkar and Iskander [Panwalkar and Iskander, 1977:52].

Based on the literature review, it is expected that wait times should be reduced with the SPT dispatching rules. No direct comparisons of the LNQ, AHEAD, and FCFS were found, and therefore expected results are uncertain.

3.3.7 Dispatching rules for Facility Utilization. In addition to the application of dispatching rules after a facility has been freed, dispatching rules are also applied

in the case when two or more facilities are available and capable of processing an arriving aircraft. For example, in configuration option 6, if a C-141 aircraft arrives for depaint and buildings 50, 54, and 89 are available, a dispatching rule is required to determine which facility the aircraft will enter. Two dispatching rules investigated are based on minimum utilization and maximum current idle time. These dispatching rules are executed upon arrival of an aircraft for a paint/depaint operation which more than one facility is capable of performing. These two rules were investigated in a preliminary analysis and found to have no significant difference in effect on aircraft throughput. Since the facility dispatch rule based on maximum idle time appeared to do better in terms of average wait time, it was selected as the rule and fixed for all future investigations. For this technique, if more than one facility is available and capable of performing the operation, the facility which has been available the longest will be selected.

The two facility utilization techniques are described in Appendix C. Results of simulation runs using both facility dispatching techniques are provided in Appendix A. Figure 3.4 provides a flow chart representation of these dispatching techniques.

3.4 Simulation Output

To adequately determine the effects of configuration and dispatching techniques, the following output data was collected on each simulation model:

Time in System. Time in system statistics were collected for all aircraft, all aircraft requiring paint, C-130 aircraft, C-141 aircraft, and C-141 aircraft requiring usage of the paint/depaint facilities.

Completion Times. Time of completion (amount of time required to process all scheduled aircraft) was collected for all aircraft requiring speedline work (183 scheduled), completion of last CW Box aircraft (8 scheduled), last C-141 aircraft (191 scheduled), and last C-130 aircraft (44 scheduled).

Wait Times. The average amount of time an aircraft waits for usage of each paint/depaint facility as well as an overall average.

Facility Utilization. The percent of time buildings 50, 54, and 89 are busy will also be collected.

3.5 Verification and Validation

Verification and validation (V & V) of the simulation models is a significant process in the model formulation. The model was verified for accuracy throughout its construction and modifications. Validation of the simulation results was a more difficult task to accomplish due lack of data from the actual system.

3.5.1 Verification. The model was verified by several verification techniques including degenerative tests, and executing a computerized trace of aircraft flow through the model. Degenerative tests were conducted by removing all but one aircraft input type. The flow days for this type of aircraft were compared to expected total critical path times for the aircraft type plus average waiting times for resources. Resource capacities were also increased to eliminate wait times and again flow times were compared to critical path time.

The model was also verified by executing a computerized trace of the aircraft through the model. SLAM II is well suited to conduct such a trace with the MONTR,TRACE command. Aircraft flow as well as file manipulations were verified by the trace to ensure flow and dispatching occurred as intended.

3.5.2 Validation. Validation is the process of establishing that the simulation model is an accurate representation of the system under study [Law and Kelton, 1991:299]. Actual data was not available for modeled resource levels or arrival rates. However, flow days for aircraft by type were compared to field expert estimations (estimations were gathered through a combination of telecons and TDYs). By comparing estimated values with those

resulting from the model while considering wait times, the only conclusion that could be made is the output values were within reason.

A structured walk through of the model with personnel form WR-ALC (Col Scoskie, WR-ALC/LJP, and Capt Colter, WR-ALC/LJPL) was conducted. The purpose of this walk through was to validate the model's accuracy and logic, as well as verify the accuracy of the assumptions for activity durations [Scoskie and Colter, 1992].

3.5 Chapter Summary

Within this chapter, the simulation model was discussed along with the progression of C-130 and C-141 aircraft through the model. The flow of the aircraft is determined by the maintenance it requires. Aircraft are inserted into the system to serve as an initial warm-up for the system, as well as to maintain pressure on the system after the last scheduled aircraft has entered the model. As aircraft require a paint/depaint operation, the facility to perform the operation is chosen based on need and facility dispatching rule. The facility dispatching rules considered include evenly distributing facility utilization, and selection based on current free time. If no facility is available to perform the required operation, the aircraft is placed in the file associated with the operation required.

When a facility becomes free, if aircraft are waiting, a dispatching rule is used to determine which aircraft enters the facility. These following dispatching rules were tested: first come, first served (FCFS), shortest processing time (SPT), largest number in queue (LNQ), or a look ahead heuristic.

IV. Analysis Methodology

This chapter will layout the framework of the experimental design used within this research, describe the sensitivity analysis conducted, and describe the statistical analysis performed on the output data. Also, this chapter will present issues which bound utilization rates.

4.1 Experimental Design

To conduct the analysis, a full factorial experimental design is established to examine each possible factor option. The factors and levels to be analyzed for the experimental design are provided in Table 4.1. The full factorial design is detailed in Table 4.2.

Table 4.1 Experimental Design Factors and Levels

Factor	Levels	
Configuration Options	5	(1, 2, 3, 5, 6)
Aircraft Dispatching Rules	4	(FCFS, AHEAD, LNQ, SPT)

A detailed description of each factor and its associated levels is provided in Chapter III. These levels were chosen by request from WR-ALC (in the case of

configuration options), for ease of implementation, and potential for impact on aircraft throughput and wait time. In total, 20 simulation models were constructed to complete this experimental design.

Table 4.2 Experimental Design

Configuration Option	Dispatching Rule
1	FCFS
1	AHEAD
1	LNQ
1	SPT
2	FCFS
2	AHEAD
2	LNQ
2	SPT
3	FCFS
3	AHEAD
3	LNQ
3	SPT
5	FCFS
5	AHEAD
5	LNQ
5	SPT
6	FCFS
6	AHEAD
6	LNQ
6	SPT

This experimental design will be conducted with an assumed exponential arrival rate to provide a reasonable

estimate of the actual aircraft arrival process. Each model will consist of 30 independent runs. The number of runs were chosen to minimize the possibility of making a Type I (rejecting Null hypothesis when Null is true) or Type II (do not reject Null hypothesis when Null is false) error during hypothesis testing, and to ensure error terms are normally distributed random variables.

4.2 Sensitivity Analysis

The areas of concern for the sensitivity analysis include the arrival process, determination of WR-ALC system throughput capacity, and increased pressure on paint/depaint facilities. The rationale for conducting an analysis in each of these areas as well as how they were conducted is presented below.

4.2.1 Arrival Process. Since an exact two year aircraft input schedule is not available, the exponential arrival process was assumed for the above described analysis. It may be possible to increase the aircraft throughput by bettering this input schedule. Although alternate input schedules were not developed as part of this research, an arrival process assuming all aircraft are available to enter the system at time zero was considered. This arrival process should provide an upper bound for

aircraft throughput under current imposed maximum number on ground (MOG) constraints. Although not analytically proven, it is expected that aircraft throughput would increase under this arrival process.

4.2.2 System Capacity. In addition to the above listed experiment, an additional analysis has been conducted to determine the effects on C-130 and C-141 throughput when all MOG constraints are eliminated, and all aircraft are available to start maintenance at time zero. The results of this analysis was expected to provide an upperbound on the capacity of the paint/depaint facilities. Again, the experimental design detailed in Section 4.1 was used with the arrival process with all aircraft available at time equals zero, and all MOG constraints removed.

4.2.3 Increased Pressure on Paint/Depaint Facilities. With the possibility of "Operation Proud MAC" being implemented in the near future, an area of concern at WR-ALC is the excess capacity of the paint/depaint facilities. To determine the effect of increased pressure on aircraft throughput across each configuration option and dispatching rule, the experimental design of Section 4.1 was repeated, with the arrival process assumed exponential. The difference with this analysis is the number of aircraft

which undergo paint/depaint operation was increased by 48 aircraft. This is conducted by converting 48 of the C-141 SL aircraft to SL-Paint type aircraft.

4.3 Statistical Significance Testing

Throughput, defined as the total number of aircraft (both C-130 and C-141) completing the system within the two year period of interest, has been used as the primary criteria for evaluation of this experimental design. In addition to aircraft throughput, the average time each aircraft spends waiting for a paint/depaint facility will also be evaluated. A complete pairwise comparison is necessary to determine the best configuration option/dispatching rule combination. To accomplish these comparisons, the PROC GLM procedure of the SAS Language will be utilized. The PROC GLM procedure uses the method of least squares to fit General Linear Models. The factor levels in this experimental design are qualitative in nature which is accommodated by PROC GLM. The main effects of each factor will be investigated as well as each interaction term for significant effect on aircraft throughput and wait time. All testing and comparisons will be conducted at a 90% confidence level. It is assumed that all error terms within the theoretical model are independent normal random variables, with a mean of 0 and a constant variance. This

assumption will be verified using a plot of residual values versus predicted values from the estimated linear model.

The strategy for the analysis will be as follows [Neter *et al*, 1990:730] :

1. Determine whether the two factors interact. To determine if the two factors interact, the null hypothesis that interaction effects are not present is tested. The test statistic, F^* (= interaction mean squares/mean squared error) will be computed automatically by PROC GLM and provided in the ANOVA table. A large F^* indicates the possible existence of interactions. F^* is compared to F critical to test these hypothesis.

2. If factors do not interact, determine whether the main factor effects are important. To determine if the main factors effects are important, the null hypothesis that main factor effects are not present is tested. This test is conducted for each factor. The test statistic, F^* (= main effect mean squares/mean squared error) will be computed automatically by PROC GLM and provided in the ANOVA table. A large F^* indicates the existence main factor effects. F^* is compared to F critical to test these hypothesis.

2.a. If main effects are important, conduct a comparison of means. Since only pairwise comparisons will be made, the method of choice is the Tukey Method [Neter *et al*, 1990:585-587]. The Tukey method comparison will be used if one or both main effects is/are determined to be important.

3. If the factors do interact, determine if interactions are important or unimportant. The determination of important versus unimportant will be based on the severity of the interaction effects, and is, admittedly, a judgement decision. Differences in wait times of less than 1.5 days and differences in throughput values of 1 AC or less will be considered unimportant [Colter, 1992].

3.a. If the interactions are unimportant, proceed as in step 2.

3.b. If the interactions are important, attempt to eliminate interaction effects using simple transformations of scale. If transformations eliminate interactions, proceed as in step 2. For important interactions that

cannot be made unimportant, analyze the two factor effects jointly in terms of treatment means.

4.4 Utilization Rate Issues

WR-ALC management requested that utilization rates for the facilities be considered within this research. Ravindran, Phillips, and Solberg [Ravindran *et al*, 1987:321-322] demonstrate that for a stochastic, single server queue model, a 100% utilization rate may not be achievable. As the utilization rate approaches 100%, queue sizes approach infinite length. Not only does the queue size approach an infinite length, but the average queue length also approaches infinity. Obviously, this is not a feasible consideration for the WR-ALC system. It is further concluded by the authors that by limiting the average queue length of the single server model to 5, the utilization rate achieved is only 85%. A further complicating factor not considered by this model, is the induced variability due to random arrival times as well as service times. Considering these factors, it should not be of great concern if the facilities do not achieve a 100% utilization rate under either arrival rate investigated.

V. Results

This chapter reports the outcome of the research analysis described in the previous chapter. The primary purpose of this research was to determine the effects of configuration options and dispatching rules on aircraft throughput. Additionally, aircraft waiting times for paint/depaint facilities are also considered. This chapter will initially describe and present an upper bound for facility capacity, provide output results, and finally present the sensitivity analysis on the models.

5.1 Facility Capacities

An understanding of the capacity for each configuration option is required to gain an insight on expected results. A rough estimate for each option's capacity is presented below.

First, the time required to process each aircraft type is computed as follows:

<u>C-141 Aircraft</u>:

A C-141 aircraft which will undergo the paint/depaint process will require on the average, 4 days for Depaint, 1 day for wash, etch and alodine (W/E/A), and 4 days for paint, or a total of 9 days/aircraft required processing

time. Under the current schedule, **87** C-141 aircraft will require this process (33 SL-Paint, 46 SL-PDM-Paint, 8 CW) over the next two years. Therefore total expected processing time required can be computed as follows:

87 AC * **9** days/AC = **783** days processing time required.

<u>Standard C-130 Aircraft</u>:

A C-130 aircraft which will undergo the paint/depaint process will require, on the average, **1** day for W/E/A and **3** days for paint. Time required to depaint is dependent upon configuration option. In configuration option 1, C-130 aircraft are chemically depainted. The duration for this process is **3** days. Under Options 2, 3, 5, and 6, C-130 aircraft are depainted by media blasting. Media blasting requires **10** days to process. Therefore a standard C-130 under Option 1 will require **7** days per aircraft, and under all other options require **14** days per aircraft. With the current schedule, **30** standard C-130 aircraft will require the paint/depaint process. Therefore, total expected processing time for a standard C-130 is determined as follows:

(Option 1)

30 AC * **7** days/AC = **210** days processing time required.

(Options 2, 3, 5, 6)

30 AC * **14** days/AC = **420** days processing time required.

Scuff Sand C-130 Aircraft:

A scuff sanded C-130 aircraft requires, on the average, .65 days for the incoming wash, .65 days scuff sanding, .65 days for outgoing wash, and 1.5 days for paint. Under the current schedule, 14 C-130 aircraft will require this process. Therefore the total processing time requirement for a scuff sanded C-130 aircraft is determined as follows:

14 AC * 3.45 days/AC = 48.3 days processing time required.

Next, the total expected processing time required for C-141 and C-130 processing is determined. As discussed above, with configuration Option 1, all standard C-130 aircraft will be chemically depainted, and media blasted in all other possible configuration options. With this in mind, the capacity for each paint/depaint configuration option is presented below:

Option 1:

	Processing Time Requirement
C-141	783 days
Standard C-130	210 days
Scuff Sand C-130	48.3 days
Total Processing Time Required	1,041.3 days

For Option 1, to determine a lower bound for expected processing time, it can be assumed 2 aircraft can be

processed simultaneously (1 in paint, 1 in depaint, or W/E/A). Therefore, the expected time needed to process these aircraft will be at least:

$$\frac{1{,}041.3\ days}{2\ machines} = 520.65\ days\ required$$

Assuming there are 354 work days available each year, 709 days are available over the period of interest (FY92 and FY93). Total processing days required falls well within the 709 days available (73.4 % of available time required).

Option 2:

	Processing Time Requirement
C-141	783 days
Standard C-130	420 days
Scuff Sand C-130	48.3 days
Total Processing Time Required	1,251.3 days

For Option 2, all C-130 aircraft are processed within building 50, and all C-141 aircraft are processed by buildings 54 and 89. These aircraft may be considered separately under this configuration option. For C-141 aircraft, it can again be assumed 2 aircraft can be processed simultaneously (1 in paint, 1 in depaint, or

W/E/A). Therefore, the time needed to process C-141 aircraft will be:

$$\frac{783\ days}{2\ machines} = 391.5\ days\ required$$

This time requirement falls well within the 709 processing days available (55.2 % of available time required).

For C-130 aircraft, only one aircraft can be processed at a given time. Therefore, the time needed to process C-130 aircraft will be:

$$\frac{468.3\ days}{1\ machine} = 468.3\ days\ required$$

This time requirement falls well within the 709 processing days available (66.1 % of available time required).

<u>Option 3</u>:

Option 3 allows a C-141 aircraft to undergo W/E/A and/or paint in building 50 if building 89 is occupied. Although not directly computed, it is inferred expected time requirements in buildings 54 and 89 will decrease, and building 50 time requirements will increase. However, it

should be noted that since the lower bound or expected time to complete C-130 processing in building 50 is greater than expected C-141 processing, this option would not improve the time required for all the aircraft processing.

Option 5:

Option 5 uses each paint/depaint facility independently (available to process C-130 or C-141 aircraft). For this configuration option, facility capabilities are slightly less than an option for which each facility is capable of performing all paint/depaint operations (Option 6). Therefore, to determine a lower bound on expected processing time required, it can be assumed 2.75 aircraft can be processed simultaneously. The time needed to process these aircraft will be:

$$\frac{1{,}251.3\ \textit{days}}{2.75\ \textit{machines}} = 455\ \textit{days required}$$

Assuming there are 354 work days available each year, 709 days are available over the period of interest (FY92 and FY93). Total processing days required falls well within the 709 days available (64.2 % of available time required).

Option 6:

Option 6 increases the capability of buildings 54 and 89 such that all three buildings can accomplish any paint/depaint operation, independent of aircraft type. To determine a lower bound on expected processing time required, it is assumed 3 aircraft can be processed simultaneously. Therefore, the time needed to process these aircraft will be:

$$\frac{1{,}251.3\ days}{3\ machines} = 417.1\ days\ required$$

And as expected, processing days required falls well within the 709 days available (58.8 % of available time required).

From these estimates of each configuration option's capacity, it does not appear that the paint/depaint facilities will be a bottleneck under current input goals. Given the low expected utilization rates, from the research of Ravindran, Phillips, and Solberg [Ravindran *et al*, 1987:321-322] (presented in Section 4.4), average queue sizes are also expected to be small. Therefore it is expected that waiting times for the paint/depaint facilities will be small. Unfortunately, these estimates do not take into consideration the inherent variability and complexities

of the WR-ALC system. Therefore, these estimates will only be used for comparison purposes to determine if simulation results appear reasonable.

5.2 Configuration Option Comparison

The primary measure of effectiveness for comparison of configuration options is aircraft throughput, or how many aircraft the system can process in the two year period of interest. Each configuration option was combined with each of four dispatching techniques considered in this analysis. The abbreviations for dispatching techniques are as follows:

FCFS - First Come, First Serviced
AHEAD - Look Ahead heuristic
LNQ - Largest Number in Queue
SPT - Shortest Processing Time

Each combination of configuration option and dispatching technique was evaluated with an assumed exponential aircraft arrival rate. Table 5.1 presents the simulation output results (based on 30 simulation runs per configuration option/dispatching technique option). Figures 5.1 and 5.2 provide this data in graphical format. Table 5.2 provides facility utilization rates defined as the percent of time each facility is busy. Aircraft throughput is defined as all aircraft (C-130, and C-141) which depart the system within the two year period of interest. The

desired number of aircraft to complete the system in two years is 235. Wait times are defined as the average time which all aircraft (C-130 and C-141) wait for paint/depaint facilities. Simulation output results including times in system, completion times, facility utilization, as well as further breakouts of presented data are available in Appendix A.

Table 5.1 Simulation results for Exponential Arrival Rates

Option	Dispatching Rule	ave. Aircraft Throughput (# AC)	ave Wait Time (days)
1			
	FCFS	169.2	7.1
	AHEAD	167.5	7.6
	LNQ	168.1	7.7
	SPT	169.8	5.6
2			
	FCFS	171.6	4.5
	AHEAD	171.2	4.6
	LNQ	171.2	4.6
	SPT	171.4	3.9
3			
	FCFS	171.2	4.3
	AHEAD	170.8	4.2
	LNQ	171.4	4.6
	SPT	173.3	3.7
5			
	FCFS	169.8	2.9
	AHEAD	171.7	2.7
	LNQ	169.1	3.0
	SPT	170.9	2.8
6			
	FCFS	172.2	0.8
	AHEAD	170.5	0.8
	LNQ	171.4	0.7
	SPT	169.2	0.8

Table 5.2 Facility Utilization Rates
(Exponential Arrival Rate)

Configuration Option	Facility Utilization Rate		
	Bldg 50	Bldg 54	Bldg 89
1	N/A	0.79	0.56
2	0.68	0.54	0.41
3	0.72	0.54	0.55
5	0.73	0.56	0.56
6	0.55	0.55	0.55

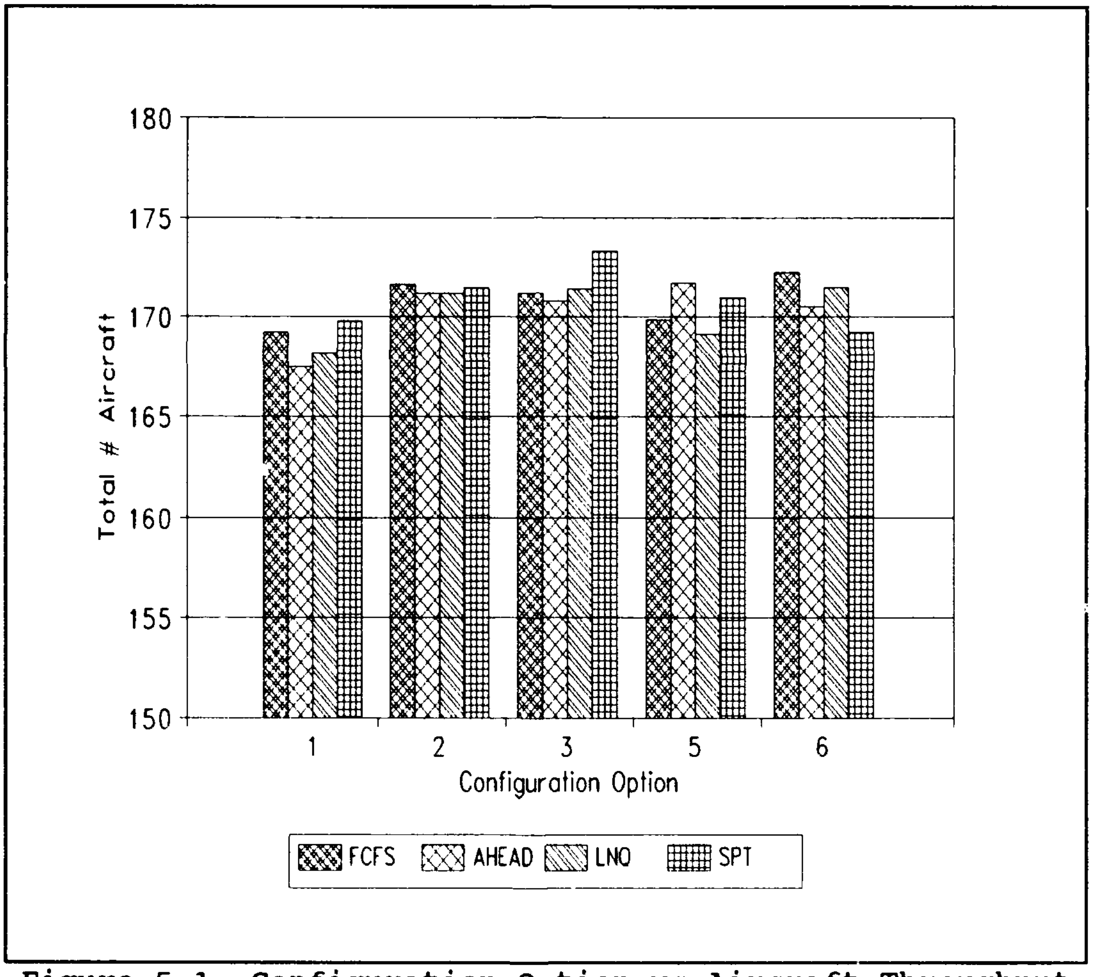


Figure 5.1 Configuration Option vs Aircraft Throughput
(EXP Arrivals)

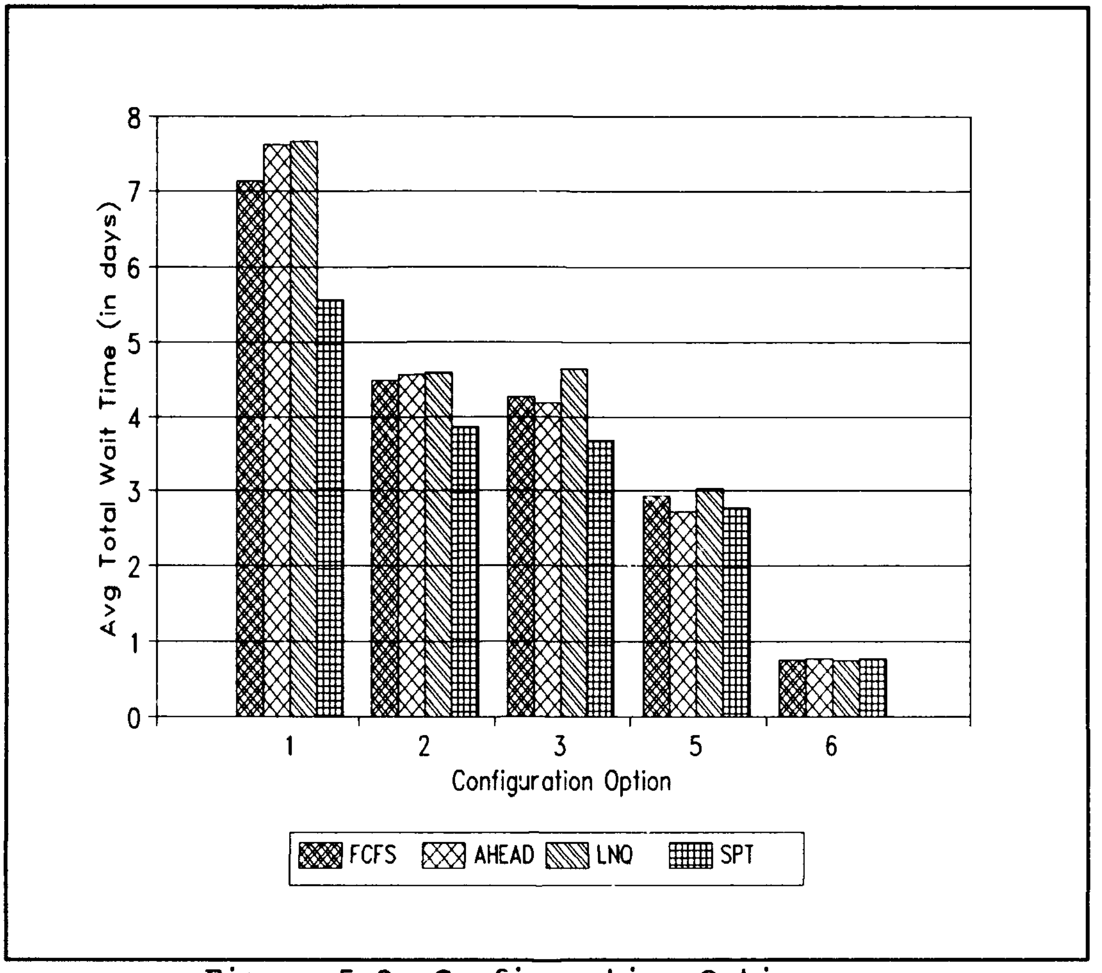


Figure 5.2 Configuration Option vs Wait Time (EXP Arrivals)

5.3 Output Analysis

The following sections will provide an analysis of the output results obtained from the simulation. An analysis will be presented for both throughput and wait time results.

5.3.1 Effects of Configuration Options and Dispatching Rules on Aircraft Throughput. As can best be shown by Figure 5.1, the investigated factors (configuration option and dispatching rules) have minimal, if any, impact on aircraft throughput. A complete analysis (As described in Chapter IV) was performed on the output data and provided in Appendix D and discussed below.

By examination of the ANOVA table, it is concluded that the interaction effects are not significant at a 90% confidence level. Also, by reviewing the ANOVA table it is concluded that the main dispatching rule effect on aircraft throughput is not statistically significant. Only the main configuration option effect is determined to be significant.

Looking at the main configuration option effect, no statistical difference is found between configuration Options 2, 3, 5, or 6. However, configuration Option 1 (baseline model) is found to be significantly different from the grouping of configuration options 2, 3, 5, and 6.

The Tukey groupings showing main configuration option effect and main dispatching rule effect on aircraft throughput are shown in Table 5.3 and 5.4, respectively. Means with the same Tukey grouping letter are determined to not be significantly different from each other.

From a visual inspection of the residual plot (provided in Appendix D), the model assumptions of random residual and constant variance is verified.

Table 5.3 Main Configuration Option Effect on Aircraft Throughput (Exponential Arrival Rate)

Tukey Grouping	Mean Aircraft Throughput (# of AC)	Configuration Option
B	168.63	1
A	171.31	2
A	171.65	3
A	170.37	5
A	170.83	6

Means with the same letter are not significantly different

Table 5.4 Main Dispatching Rule Effect on Aircraft Throughput (Exponential Arrival Rate)

Tukey Grouping	Mean Aircraft Throughput (# of AC)	Dispatching Rule
A	170.79	FCFS
A	170.28	AHEAD
A	170.23	LNQ
A	170.91	SPT

Means with the same letter are not significantly different

The rationale for these results can be attributed to the utilization of the facilities. As described in Section 5.1, total paint/depaint processing time required falls well below processing time available for each configuration option. Under the present aircraft input

requirements, paint/depaint facilities are not a major constraint on the system. This issue will be further investigated within the sensitivity analysis portion of this chapter.

To further demonstrate that the paint/depaint facilities are no longer a bottleneck of the WR-ALC system, a model was constructed by modifying option 6. This model used the facility capabilities of option 6 (all facilities capable of performing each paint/depaint operation) and increased the number of each to 10. In essence, this model assumed 30 fully capable paint/depaint facilities were available. If the paint/depaint facilities were a bottleneck, it would be expected that throughput results would increase significantly. However, based on ten model runs, throughput results increased by only one aircraft over the two year period of interest, further verifying the paint/depaint facilities are not constraining the WR-ALC system.

5.3.2 Effects of Configuration Options and Dispatching Rules on Aircraft Wait Times. As best demonstrated in Figure 5.2, there does appear to exist a correlation between the investigated factors and average wait time. As with aircraft throughput analysis, the initial step is to determine if interaction effects are significant. From the

ANOVA table it is concluded that the interaction effects are statistically significant at a 90% confidence level. However, using the criteria discussed in Chapter IV, by inspection of these interaction effects, it is assumed interaction effects are not important (effects are minimal). Also by reviewing the ANOVA table it is concluded that both main factor effects are significant.

Looking at the main configuration option effect on wait time, difference exists between each configuration option, with the exception of configuration options 2 and 3. For dispatching rules, no statistical difference is found between FCFS and AHEAD dispatching rules, however this testing concludes LNQ and SPT differ from each other as well as AHEAD or FCFS. Although a statistical difference does exist between dispatching rules, this difference can be considered unimportant (less than .7 days in worst case).

The Tukey groupings showing main configuration option effect and main dispatching rule effect on wait time are presented in Table 5.5 and 5.6, respectively.

Table 5.5 Main Configuration Option Effect on Wait Time (Exponential Arrival Rate)

Tukey Grouping	Wait Time (days/AC)	Configuration Option
A	7.00	1
B	4.34	2
B	4.19	3
C	2.86	5
D	0.76	6

Means with the same letter are not significantly different

Table 5.6 Main Dispatching Rule Effect on Wait Time (Exponential Arrival Rate)

Tukey Grouping		Wait Time (days/AC)	Configuration Option
B	A	3.92	FCFS
B	A	3.94	AHEAD
	A	4.13	LNQ
	C	3.32	SPT

Means with the same letter are not significantly different

The wait time results appear to fall within reason. With less than full pressure on the paint/depaint facilities, dispatching rules are not capable of having an impact on wait times. Minimal queue sizes are developing at each facility, and therefore facility entry decisions will closely resemble those of the FCFS dispatching rules. The impact of this can best be shown in Figure 5.4. By design, configuration Option 1 provides the most pressure on the paint/depaint facilities due to limited capabilities of the facilities (utilization rate computed to be 79% for Bldg 54

and 56% for Bldg 89). The effects of dispatching rules are seen for this option and the robustness of the SPT dispatching rule is once again demonstrated. Overall, the effects of dispatching rules decrease as facility capabilities increase.

From a visual inspection of the residual plot (provided in Appendix D), the model assumptions of random residual is verified, however it does appear that as facility capabilities increase, the variance of the output data decreases.

5.4 Sensitivity Analysis

The areas to be covered within this sensitivity analysis include determination of system capacity, increased pressure on paint/depaint facilities, and effects of aircraft preemption. The rationale for conducting each sensitivity analysis is presented in Chapter IV.

5.4.1 All aircraft available at T=0. By assuming all aircraft are available for maintenance at time zero, an upper bound for aircraft throughput has been estimated under current MOG constraints, input order and mix of required processing. The analysis of output results are summarized below and presented in detail in Appendix A. Additional simulation output results including times in system,

completion times, facility utilization, as well as further breakouts of presented data are available in Appendix A.

5.4.1.1 Effects of Configuration Options and Dispatching Rules on Aircraft Throughput. As with the exponential arrival rate data, the investigated factors (configuration option and dispatching rules) have minimal, if any, impact on aircraft throughput. These results further verify the conclusion that the paint/depaint facilities are no longer a bottleneck of the WR-ALC system.

5.4.1.2 Analysis of Results on Aircraft Wait Times. The wait time results differ only slightly from those obtained under the exponential arrival rate assumption. A statistical difference is now found between configuration Options 2 and 3, however this difference is assumed unimportant (0.14 days). Differences are again found for dispatching rule levels and, as with the exponential arrival rate, are assumed unimportant (0.53 days in worst case scenario).

5.4.1.3 Comparison of Arrival Rates. Aircraft throughput, across all factor effects, is increased by allowing all aircraft to be available for maintenance at T = 0. The overall mean for aircraft throughput under the

exponential arrival process is **170.55** aircraft over the two year period, and **179.18** aircraft for arrivals at T=0 assumption. Due to the large number of simulation runs (600 for each arrival rate), it is concluded without a formal statistical comparison that this difference is significant and important. It can be concluded from these results that by establishing a better aircraft input schedule, aircraft throughput can be increased by approximately 5 aircraft per year. Although the best input schedule for the WR-ALC system is not known, these results do show that at least 5 more aircraft could be expected to be processed per year under a different input schedule.

For wait time, the overall mean for wait time under the exponential arrival process is **3.82** days per aircraft, and **3.41** days for the arrivals at T=0 assumption. Although these differences may be statistically significant, they are not considered important (0.41 day difference). These values are contrary to expected results (as arrival rate is increased, wait times expected to increase). The exact reason for this is not known, however it is speculated that system constraints are affecting the arrival process to each paint/depaint facility.

5.4.2 MOG Sensitivity Analysis. Simulation models were constructed to determine the overall capacity of the

WR-ALC C-130 and C-141 maintenance operation. To accomplish this task all maximum number of aircraft (MOG) constraints are removed from the model, and all aircraft are assumed to be available to enter the system at the start of the simulation, or time = 0. It is expected that by eliminating the MOG constraints, throughput values should increase. For configuration Options 1 and 2, throughput results for the constrained system were found to be less than those of the unconstrained system. Also for the unconstrained system, as facility capabilities increased (from Options 3 to 5 or 6), throughput results decreased. Output result are provided in Appendix A. These output result anomalies appear to be dependent upon decisions and constraints from factors other than those considered within this research (configuration options and dispatching rules). Therefore, these results are not presented formally within this research. An in-depth examination of the output identifies the decision criteria on entering C-141 speedline hangars as a likely cause for these anomalies.

A speedline-PDM (SL-PDM) or SL-PDM-Paint aircraft entering SL hangars has the option of entering the SL-PDM hangar and completing both operations in hangar, or if these hangars are full, entering a standard SL hangar for SL operations, followed by the completion of PDM outside of hangar. A SL or SL-Paint C-141 can only enter a SL hangar

and will not have the option of entering the SL-PDM hangar. The decision process for determining when a SL-PDM or SL-PDM-Paint utilizes the SL hangar appears to have a significant impact on the results of these models.

With MOG constraints in place, if the queue of aircraft awaiting the SL-PDM hangar exceeded 4 aircraft, the next arriving aircraft would enter the SL hangar queue. Using this criteria for the capacity models, very poor output results for aircraft throughput resulted. Initially this critical queue size was increased to 6 with little improvement to output anomalies. The final decision process attempted allowed an arriving SL-PDM or SL-PDM-Paint aircraft to enter the smallest queue. Output results did improve, however Option 6 results remained suspicious. To validate these assumptions, models for configuration Options 2, 5, and 6 under FCFS dispatching techniques were terminated at various times to gain an insight on how these queues filled. These results are presented in Table 5.7. queue sizes are based on 3 observations per simulation run.

Table 5.7 Accumulation of Queue sizes to enter Speedline and Speedline-PDM hangars

Time	Option 2	Option 5	Option 6
(days)	Hangar queue SL / SL-PDM	Hangar queue SL / SL-PDM	Hangar queue SL / SL-PDM
200	67 / 44	68 / 39	102 / 5
300	62 / 53	62 / 53	100 / 22
400	51 / 54	52 / 54	89 / 21
500	33 / 45	36 / 47	72 / 14
600	16 / 32	18 / 33	54 / 1
709	0 / 14	0 / 15	33 / 0

Although these differences in queue size accumulation may not be solely dependent upon the queue entry decision, these differences will have an impact on aircraft throughput results. These effects are most evident when comparing throughput values of configuration option #6 against all other options (throughput is less despite increased paint/depaint facility capabilities). Further analysis to determine the appropriate decision criteria is outside the scope of this research but should be investigated further for impact on the MOG constrained system.

5.4.3 Increased pressure on Paint/Depaint Facilities. As discussed in above sections, under the current input schedule, the paint/depaint facilities do not appear to be a constraint on aircraft throughput. This conclusion is based on the results of the facility capacity analysis presented

in Section 5.1 and utilization rates and wait time results presented in Section 5.3 (both found to be low). To increase the pressure on the system and to further evaluate the effects of configuration options and dispatching techniques, the number of aircraft requiring paint is increased in the simulation model. An increase of 48 C-141 aircraft requiring paint are added by alternating the number of SL and SL-Paint aircraft entered into the system. Previous models assumed 81 SL aircraft and 33 SL-Paint aircraft would enter the system over the two year period of interest. For the following evaluation these values are reversed, or 33 SL aircraft and 81 SL-Paint aircraft are entered into the system. The total number of aircraft entering the system remains at 235, however the total number to undergo the paint/depaint process increases from 131 to 179. Arrival rates for this analysis are assumed to be exponentially distributed. A formal analysis of this data is provided in Appendix D and summarized below. Additional simulation output results including times in system, completion times, facility utilization, as well as further breakouts of presented data are available in Appendix A.

5.4.3.1 Effects of Configuration Options and Dispatching Rules on Aircraft Throughput. For these models with an increased number of paint aircraft, a more distinct correlation is demonstrated between aircraft throughput and

configuration option. Configuration option 6, as originally anticipated, does provide an statistically significant increase in aircraft throughput (averaging 171.9 aircraft over two year period). Configuration options 2, 3, and 5 provide almost identical throughput results (averaging approximately 167), and Option 1 provided, as expected, the worst throughput results (averaging 156.1). Although the configuration option does have a significant effect on aircraft throughput, dispatching rules however, have minimal, if any, impact on aircraft throughput.

5.4.3.2 Effects of Configuration Option and Dispatching Rules on Wait Time. A statistical difference is found between the effect of each configuration on wait time. As expected, configuration option 6 produces the minimum wait time (2.56 days), followed by each configuration option in descending order.

For dispatching rule level effects, FCFS, LNQ, and AHEAD provide no significant difference in effect on wait times. However, under this increased pressure on paint/depaint facilities, the robustness of the SPT dispatching rule is demonstrated. Wait time under the SPT dispatching rule are decreased by approximately 3 days per aircraft over other investigated dispatching rules.

These results conform to the expected results for the system (increase in throughput and decrease in wait time as facility capabilities increase).

5.4.3.3 Comparison of Results. Aircraft throughput, across all factor effects is, as expected, decreased by increasing the number of paint aircraft. The overall mean for aircraft throughput with 131 paint aircraft entered into the system (Section 5.2) is **170.55** aircraft over the two year period, and **166.05** aircraft for the increased pressured system (179 paint aircraft entered). Due to the large number of simulation runs (600 for each arrival rate), it is concluded without a formal statistical comparison that this difference is significant and important. However, the statistical testing does not measure the full impact of these results. By increasing the number of paint aircraft by 48, overall expected aircraft throughput is decreased by only 2 aircraft per year. The effects of the dispatching rules are brought out by the increase in pressure, however overall impact of dispatching rule on aircraft throughput is minimal under this altered input (less than 1 aircraft per year).

For wait time, the overall mean under the anticipated aircraft input levels is **3.82** days per aircraft, and **12.15** days for the increased pressured system. Obviously these

differences are statistically significant and important. The rationale for these results is due to the increased pressure on the system as demonstrated by the increase in facility utilization rates.

5.4.4 Preemption. A preemption technique has been utilized in the past at WR-ALC to preempt, or "break" an aircraft within depaint or wash, for an aircraft awaiting wash, etch and alodine (W/E/A), if the paint facility is unoccupied. To determine the effects of this preemption, this analysis has been limited to configuration options 2 and 3, and assumed an exponential aircraft arrival rate. These assumptions are used since Option 1 is only being used as a baseline for comparisons, and Options 5 and 6 increase the available paint facilities which eliminates the need for preemption. Each preempted aircraft will have first priority to reenter the facility once it has been released. Also, the preempted aircraft will require its remaining processing time, as well as incur an additional 8 hours of required processing time accounting for towing in and out of the facility and remasking of the surface of the aircraft. For this study, a C-141 aircraft undergoing depaint (Bldg 54) will be preempted if an aircraft arrives requiring W/E/A (Bldg 54) and the paint facility (Bldg 89) is available.

Simulation results are presented in Table 5.8. Facility utilization rates are presented in Table 5.9.

Table 5.8 Simulation results for Exponential Arrival Rates and allowed Preemption

Option	Dispatching Rule	ave. Aircraft Throughput (# AC)	ave Wait Time (days)
2			
	FCFS	171.4	5.8
	AHEAD	170.1	6.0
	LNQ	170.9	5.9
	SPT	168.3	5.3
3			
	FCFS	170.8	4.8
	AHEAD	169.9	4.9
	LNQ	171.2	5.0
	SPT	170.7	4.5

Table 5.9 Facility Utilization Rates for Exponential Arrival Rate and Allowed Preemption

Configuration Option	Facility Utilization Rate		
	Bldg 50	Bldg 54	Bldg 89
2	0.69	0.63	0.40
3	0.77	0.60	0.34

Comparing these results to the non-preempted data (Table 5.1) shows this preemption technique does not

significantly improve or worsen aircraft throughput, or decrease wait times. Based on observation, approximately 28 aircraft were preempted under configuration option 2, and 22 aircraft were preempted under configuration option 3 over the two year simulation.

VI. Conclusions and Recommendations

This chapter summarizes the results of this research and provides a discussion relevant to these results. This chapter will also provide suggestions and recommendations for future work uncovered as part of this research.

6.1 Conclusions

The primary objective of this research was to determine the effects of configuration options and dispatching rules on aircraft throughput for Warner Robins Air Logistics Center (WR-ALC) paint/depaint facilities. To determine these effects, an experimental design was constructed to study the effects of configuration options and dispatching rules on aircraft throughput. The configuration options investigated included a baseline model (Option 1), an "as is" model (Option 2), two models representing policy changes (Options 3 and 5), and an option representing both policy changes and upgrades to current paint/depaint facility capabilities. Manpower was assumed adequate to perform all operations. Simulation was used as the tool to evaluate each configuration option. Dispatching rules considered were based on first come, first served (FCFS), a look ahead

heuristic (AHEAD), largest number in queue (LNQ), and shortest processing time (SPT).

While this research was ongoing, policy changes at WR-ALC altered the aircraft throughput goals, and, more relevant to this research, reduced the number of aircraft requiring the paint/depaint facilities. At the time this research began, the paint/depaint facilities were identified as a bottleneck of the system. With the reduction in number of aircraft requiring paint, and under current throughput goals, paint/depaint facilities are no longer a bottleneck for the system. Therefore, excluding the baseline configuration, none of the configuration options investigated provided a significantly larger aircraft throughput than any of the others.

This conclusion proved valid over each dispatching rule investigated and over two aircraft arrival assumptions. The two arrival process assumptions investigated represented a best estimate for current input schedule (exponential arrival rate) and a best case input schedule (all aircraft available to enter the system at time zero).

The conclusion also proved valid when preemption of aircraft was allowed. The effect of preemption on aircraft throughput was found to be insignificant.

The proportion of aircraft requiring paint was increased while maintaining overall aircraft input levels

constant in an effort to increase the pressure on the paint/depaint facilities. A significant result stemming from this analysis showed even with an increase in number of paint aircraft (38), only a slight decrease in aircraft throughput resulted (4 aircraft over a two year period).

The average amount of time an aircraft waits for a paint/depaint facility was also used as a measure of effectiveness. Due to the increase in facility capabilities, configuration options did significantly affect wait times, however due to limited pressure on the facilities, the effect of dispatching rules on wait times was found to be insignificant.

6.2 Recommendations for Future Analysis

Two areas were found which warrant further investigation or analysis. These areas include the decision criteria for entering speedline hangar queues and the effects of different input schedules.

The decision criteria for speedline PDM aircraft to enter either the queue of the SL-PDM hangar or the SL hangar when both hangars are full had significant impact on results when maximum number of aircraft on the ground (MOG) constraints were removed. Determining the effect of

altering this decision criteria on the MOG constrained system may be useful.

This analysis investigated two aircraft arrival assumptions for aircraft entering the WR-ALC system; an exponential arrival rate, and all aircraft being available to enter the system at time zero. These arrival assumptions had a significant effect on aircraft throughput. Future research towards developing an optimal input schedule could be useful for WR-ALC.

It is also recommended that more accurate data be collected for the model. The majority of activity durations are based on best guess estimates from field experts and the accuracy of these guesses is uncertain. Also, detailed flows of C-130 aircraft were not provided and may also impact results.

Appendix A: Simulation Output Results

This appendix provides the summary of output results for each experimental design constructed. The results provided are the average value of the 30 simulation runs.

Table A.1 Time in System and Throughput Data (Exponential Arrival Rate)

OPTION			TIME IN SYSTEM (in days)					NUMBER COMPLETED (by FY93)				
CN	DS	HU	ALL PAINT	ALL	C-130	C-141	C-141 PAINT	ALL	C-130	C-141	CW	SL
1	FC		146.3	126.9	107.0	131.5	166.2	169.2	39.3	129.9	5.1	125.1
1	AH		147.1	128.6	107.0	133.6	167.4	167.5	39.7	127.7	5.0	123.0
1	LQ		146.6	127.7	108.0	132.2	166.1	168.1	39.0	129.1	4.9	124.6
1	SP		144.0	125.6	103.4	130.7	164.5	169.8	40.7	129.1	5.0	124.2
2	FC		142.2	124.8	109.0	128.5	159.1	171.6	40.3	131.1	5.1	126.6
2	AH		142.9	125.2	109.1	128.9	160.1	171.2	39.8	131.4	5.1	126.6
2	LQ		142.9	125.2	109.1	128.9	160.1	171.2	39.8	131.4	5.1	126.6
2	SP		141.6	125.2	107.9	129.1	158.6	171.4	40.5	130.9	5.1	126.1
3	FC		142.0	124.8	109.4	128.4	158.5	171.2	39.6	131.5	5.2	126.7
3	AH		142.4	124.7	110.0	128.0	158.8	170.8	39.9	130.8	5.2	126.1
3	LQ		143.7	126.3	110.6	129.9	160.4	171.4	40.3	131.1	5.1	126.2
3	SP		140.8	124.8	108.8	128.1	157.0	173.3	40.9	132.4	5.1	127.6
5	FC	FF	141.1	125.4	105.5	130.0	159.1	169.8	39.4	130.4	5.0	125.9
5	AH	FF	139.7	123.5	104.4	127.9	157.6	171.7	40.0	131.6	5.0	126.9
5	LQ	FF	139.9	124.1	104.9	128.5	157.7	169.1	38.8	130.2	5.1	125.7
5	SP	FF	140.0	124.6	104.5	129.2	157.9	170.9	39.8	131.1	5.0	126.3
5	FC	MU	141.1	124.4	105.5	128.8	159.1	170.9	39.6	131.4	5.1	126.7
5	AH	MU	141.6	124.5	106.8	128.6	159.2	171.1	40.8	130.3	5.0	125.5
5	LQ	MU	141.2	124.5	106.5	128.6	158.8	171.5	40.1	131.4	5.0	126.7
5	SP	MU	141.9	124.7	106.1	129.0	158.5	171.2	40.8	130.4	5.2	125.4
6	FC	FF	137.8	123.3	101.0	128.4	156.5	172.2	40.2	132.0	5.2	127.0
6	AH	FF	137.6	123.1	101.4	128.1	155.9	170.5	40.1	130.3	5.1	125.4
6	LQ	FF	137.6	123.2	101.0	128.3	156.1	171.4	41.0	130.4	5.0	125.6
6	SP	FF	137.6	122.7	101.3	127.7	156.0	169.2	39.0	130.2	5.0	125.5
6	FC	MU	138.2	124.6	101.4	129.9	156.8	170.6	40.8	129.8	5.0	125.0
6	AH	MU	137.6	123.1	101.4	128.1	155.9	170.5	40.1	130.3	5.1	125.4
6	LQ	MU	137.6	123.2	101.0	128.3	156.1	171.4	41.0	130.4	5.0	125.6
6	SP	MU	137.6	122.7	101.3	127.7	156.0	169.2	39.0	130.2	5.0	125.5

CN = Facility Configuration Option
DS = Dispatching Rule
- FC = FCFS
- AH = AHEAD
- LQ = LNQ
- SP = SPT

HU = Hangar Utilization
- FF = First Freed
- MU = Minimum Utilization

ALL PAINT = All Aircraft requiring Paint
ALL = All Aircraft (C-141 and C-130)
C-141 Paint = C-141 AC requiring Paint

CW = C-141 Center Wing AC
SL = All C-141 speedline AC (SL, SL-Paint, SL-PDM, SL-PDM-Paint)

Table A.2 Utilization Rates and Wait Times Data (Exponential Arrival Rate)

OPTION			UTILIZATION RATE			WAIT TIME (in days)				
CN	DS	HU	50	54	89	WASH	DEPAINT	W/E/A	PAINT	TOTAL
1	FC		0.00	0.80	0.56	0.2	2.4	2.7	1.6	7.1
1	AH		0.00	0.79	0.55	0.2	2.5	2.8	1.8	7.6
1	LQ		0.00	0.79	0.56	0.3	2.3	3.0	1.8	7.7
1	SP		0.00	0.79	0.56	0.1	3.0	0.8	1.5	5.6
2	FC		0.68	0.54	0.41	0.3	1.5	1.6	0.8	4.5
2	AH		0.68	0.54	0.40	0.3	1.4	1.8	0.9	4.6
2	LQ		0.68	0.54	0.40	0.3	1.4	1.8	0.9	4.6
2	SP		0.68	0.54	0.41	0.2	1.9	0.9	0.8	3.9
3	FC		0.72	0.55	0.37	0.3	1.5	1.7	0.6	4.3
3	AH		0.71	0.54	0.37	0.4	1.4	1.4	0.6	4.2
3	LQ		0.72	0.54	0.37	0.3	1.4	1.9	0.7	4.6
3	SP		0.72	0.54	0.37	0.2	1.9	0.9	0.5	3.7
5	FC	FF	0.73	0.56	0.33	0.1	1.5	0.7	0.5	2.9
5	AH	FF	0.74	0.57	0.34	0.1	1.5	0.6	0.5	2.7
5	LQ	FF	0.74	0.56	0.34	0.1	1.5	0.9	0.5	3.0
5	SP	FF	0.72	0.56	0.35	0.0	1.7	0.4	0.5	2.8
5	FC	MU	0.75	0.58	0.30	0.1	1.7	0.9	0.8	3.6
5	AH	MU	0.76	0.57	0.29	0.1	1.9	0.8	0.8	3.6
5	LQ	MU	0.76	0.58	0.30	0.1	1.7	0.9	0.8	3.7
5	SP	MU	0.76	0.58	0.30	0.1	1.9	0.5	0.7	3.2
6	FC	FF	0.56	0.56	0.52	0.0	0.4	0.3	0.0	0.8
6	AH	FF	0.55	0.55	0.54	0.0	0.3	0.3	0.0	0.8
6	LQ	FF	0.55	0.55	0.55	0.0	0.3	0.4	0.1	0.7
6	SP	FF	0.55	0.55	0.55	0.0	0.3	0.4	0.0	0.8
6	FC	MU	0.54	0.55	0.54	0.0	0.4	0.3	0.0	0.8
6	AH	MU	0.55	0.54	0.54	0.0	0.3	0.3	0.0	0.8
6	LQ	MU	0.55	0.55	0.55	0.0	0.3	0.4	0.1	0.7
6	SP	MU	0.55	0.55	0.55	0.0	0.3	0.4	0.0	0.8

CN = Facility Configuration Option
DS = Dispatching Rule
FC = FCFS
AH = AHEAD
LQ = LNQ
SP = SPT

HU = Hangar Utilization
FF = First Freed
MU = Minimum Utilization

Table A.3 Time of Last Completion (Exponential Arrival Rate)

OPTION			Time of Last Completion				
CN	DS	HU	ALL	C-130	C-141	CW	SL
1	FC		1004.0	833.1	974.9	927.1	971.6
1	AH		1010.0	807.1	1005.0	943.6	999.6
1	LQ		997.1	853.7	971.4	929.5	966.3
1	SP		985.9	796.4	968.3	929.2	957.2
2	FC		975.4	781.8	969.2	921.7	963.7
2	AH		959.0	815.3	952.7	928.1	948.0
2	LQ		959.0	815.3	952.7	928.1	948.0
2	SP		980.8	785.4	967.9	930.0	963.5
3	FC		988.0	835.6	966.1	926.6	954.4
3	AH		986.2	812.8	956.3	937.7	941.5
3	LQ		973.7	799.9	960.2	930.1	955.0
3	SP		970.2	792.5	955.1	918.8	948.7
5	FC	FF	991.5	848.0	969.1	930.7	963.4
5	AH	FF	987.2	797.7	974.1	942.2	963.6
5	LQ	FF	977.5	814.9	960.1	925.0	953.6
5	SP	FF	994.1	813.7	972.5	930.5	963.9
5	FC	MU	968.2	817.1	959.1	933.1	947.3
5	AH	MU	992.4	805.4	979.5	949.6	958.6
5	LQ	MU	982.3	795.7	970.7	942.7	951.3
5	SP	MU	987.2	785.5	979.6	921.6	971.9
6	FC	FF	989.4	831.1	962.4	925.9	958.2
6	AH	FF	975.6	806.4	963.0	930.1	951.5
6	LQ	FF	982.5	799.9	958.1	929.5	952.0
6	SP	FF	972.3	825.3	957.9	926.5	948.6
6	FC	MU	991.4	792.5	977.6	946.0	963.1
6	AH	MU	975.6	806.4	963.0	930.1	951.5
6	LQ	MU	982.5	799.9	958.1	929.5	952.0
6	SP	MU	972.3	825.3	957.9	926.5	948.6

CN = Facility Configuration Option
DS = Dispatching Rule
FC = FCFS
AH = AHEAD
LQ = LNQ
SP = SPT

HU = Hangar Utilization
FF = First Freed
MU = Minimum Utilization

ALL PAINT = All Aircraft requiring Paint
ALL = All Aircraft (C-141 and C-130)
C-141 Paint = C-141 AC requiring Paint

CW = C-141 Center Wing AC
SL = All C-141 speedline AC
(SL, SL-Paint, SL-PDM, SL-PDM-Paint)

Table A.4 Time in System and Throughput Data (Preemption)

OPTION		TIME IN SYSTEM (in days)					NUMBER COMPLETED (by FY93)				
CN	DS	ALL PAINT	ALL	C-130	C-141	C-141 PAINT	ALL	C-130	C-141	CW	SL
2	FC	147.9	128.6	109.1	133.1	167.6	171.4	40.4	131.0	5.0	126.2
2	AH	147.8	128.3	109.2	132.7	167.3	170.1	40.1	129.9	5.0	125.3
2	LQ	148.6	128.8	109.6	133.2	168.4	170.9	40.9	130.0	4.9	125.3
2	SP	147.3	129.3	107.2	134.4	167.6	168.3	38.8	129.5	4.9	125.0
3	FC	146.3	127.8	110.2	131.8	164.6	170.8	40.0	130.9	5.0	126.3
3	AH	147.4	128.9	109.9	133.1	166.4	169.9	39.6	130.3	4.9	125.7
3	LQ	146.3	128.6	110.5	132.8	164.4	171.2	40.3	132.8	4.9	126.1
3	SP	145.5	127.1	108.8	131.4	164.1	170.7	40.6	130.1	5.0	125.5

CN = Facility Configuration Option
DS = Dispatching Rule
FC = FCFS
AH = AHEAD
LQ = LNQ
SP = SPT

HU = Hangar Utilization
FF = First Freed
MU = Minimum Utilization

ALL PAINT = All Aircraft requiring Paint
ALL = All Aircraft (C-141 and C-130)
C-141 Paint = C-141 AC requiring Paint

CW = C-141 Center Wing AC
SL = All C-141 speedline AC
(SL, SL-Paint, SL-PDM, SL-PDM-Paint)

Table A.5 Utilization Rates and Wait Times Data (Preemption)

OPTION		UTILIZATION RATE			WAIT TIME (in days)				
CN	DS	50	54	89	WASH	DEPAINT	W/E/A	PAINT	TOTAL
2	FC	0.68	0.64	0.41	0.17	2.89	0.97	0.59	5.25
2	AH	0.69	0.64	0.40	0.33	2.71	1.62	0.61	6.02
2	LQ	0.69	0.64	0.40	0.27	2.41	1.85	0.72	5.92
2	SP	0.69	0.65	0.41	0.17	2.88	0.97	0.59	5.25
3	FC	0.77	0.62	0.34	0.36	2.20	1.32	0.39	4.79
3	AH	0.77	0.61	0.34	0.38	2.30	1.27	0.45	4.92
3	LQ	0.76	0.61	0.33	0.31	2.22	1.50	0.51	5.07
3	SP	0.77	0.60	0.34	0.18	2.63	0.81	0.41	4.49

CN = Facility Configuration Option
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AH = AHEAD
LQ = LNQ
SP = SPT

HU = Hangar Utilization
FF = First Freed
MU = Minimum Utilization

Table A.6 Time of Last Completion (Preemption)

OPTION		Time of Last Completion				
CN	DS	ALL	C-130	C-141	CW	SL
2	FC	1015.0	795.2	1012.0	957.2	999.9
2	AH	1015.0	788.6	1002.0	944.6	984.7
2	LQ	1008.0	803.0	994.0	954.6	969.2
2	SP	1030.0	861.4	1012.0	968.0	986.6
3	FC	1027.0	830.1	1011.0	971.0	972.8
3	AH	1052.0	824.8	1038.0	984.9	995.9
3	LQ	1018.0	817.0	997.7	965.4	963.3
3	SP	1021.0	813.8	966.4	966.4	969.5

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FC = FCFS
AH = AHEAD
LQ = LNQ
SP = SPT

HU = Hangar Utilization
FF = First Freed
MU = Minimum Utilization

ALL PAINT = All Aircraft requiring Paint
ALL = All Aircraft (C-141 and C-130)
C-141 Paint = C-141 AC requiring Paint

CW = C-141 Center Wing AC
SL = All C-141 speedline AC
(SL, SL-Paint, SL-PDM, SL-PDM-Paint)

Table A.7 Time in System and Throughput Data (Arrivals at T=0)

OPTION			TIME IN SYSTEM (in days)					NUMBER COMPLETED (by FY93)				
CN	DS	HU	ALL PAINT	ALL	C-130	C-141	C-141 PAINT	ALL	C-130	C-141	CW	SL
1	FC		142.9	123.3	109.8	126.4	159.7	178.4	44.0	134.4	5.1	129.8
1	AH		143.2	123.2	109.2	126.4	160.3	178.7	44.0	134.7	5.1	130.0
1	LQ		144.0	123.8	109.7	127.1	161.3	178.8	44.0	134.8	5.1	130.1
1	SP		141.6	122.0	108.1	125.2	158.5	178.3	44.0	134.3	5.1	129.5
2	FC		140.3	121.8	110.2	124.5	155.6	180.2	44.0	136.2	5.2	131.2
2	AH		140.2	121.9	110.2	124.6	155.4	179.6	44.0	135.6	5.1	130.6
2	LQ		140.8	122.4	110.1	125.3	156.3	178.8	44.0	134.8	5.1	130.1
2	SP		139.9	121.7	109.9	124.4	155.0	179.6	44.0	135.6	5.1	130.7
3	FC		140.5	122.1	110.4	124.8	155.7	179.4	44.0	135.4	5.0	130.6
3	AH		140.4	121.9	110.4	124.5	155.5	179.7	44.0	135.7	5.1	130.9
3	LQ		140.3	122.1	110.4	124.7	155.4	179.6	44.0	135.6	5.1	130.8
3	SP		139.5	121.7	110.0	124.7	154.4	179.9	44.0	135.9	5.2	130.8
5	FC	FF	139.0	121.4	108.6	124.4	154.4	179.8	44.0	135.8	5.2	130.8
5	AH	FF	139.1	121.4	108.4	124.4	154.6	179.1	44.0	135.1	5.1	130.1
5	LQ	FF	139.2	121.3	108.6	124.2	154.7	179.6	44.0	135.6	5.2	130.7
5	SP	FF	139.0	121.2	108.5	124.2	154.5	178.7	44.0	134.7	5.1	129.9
5	FC	MU	139.8	121.6	109.5	124.4	155.2	179.4	44.0	135.4	5.1	130.6
5	AH	MU	139.9	121.8	109.0	124.8	155.5	179.4	44.0	135.4	5.2	130.6
5	LQ	MU	139.6	121.6	109.2	124.5	155.0	179.8	44.0	135.8	5.1	130.9
5	SP	MU	139.4	121.3	109.1	124.1	154.7	179.8	44.0	135.8	5.1	130.9
6	FC	FF	137.5	120.6	107.3	123.6	152.9	178.7	44.0	134.7	5.2	129.9
6	AH	FF	137.6	120.7	107.2	123.9	152.9	178.9	44.0	134.9	5.1	130.0
6	LQ	FF	137.2	120.4	107.2	123.5	152.3	179.1	44.0	135.1	5.2	130.1
6	SP	FF	137.2	120.6	107.1	123.7	152.5	178.7	44.0	134.7	5.1	129.9
6	FC	MU	137.2	120.5	107.0	123.6	152.4	178.8	44.0	134.8	5.2	129.8
6	AH	MU	137.2	120.6	107.2	123.8	152.9	178.8	44.0	134.8	5.1	130.1
6	LQ	MU	137.2	120.4	107.2	123.5	152.3	179.1	44.0	135.1	5.2	130.1
6	SP	MU	137.2	120.6	107.1	123.7	152.5	178.7	44.0	134.7	5.1	129.9

CN = Facility Configuration Option
DS = Dispatching Rule
FC = FCFS
AH = AHEAD
LQ = LNQ
SP = SPT

HU = Hangar Utilization
FF = First Freed
MU = Minimum Utilization

ALL PAINT = All Aircraft requiring Paint
ALL = All Aircraft (C-141 and C-130)
C-141 Paint = C-141 AC requiring Paint

CW = C-141 Center Wing AC
SL = All C-141 speedline AC
(SL, SL-Paint, SL-PDM, SL-PDM-Paint)

Table A.8 Utilization Rates and Wait Times Data (Arrivals at T=0)

OPTION			UTILIZATION RATE			WAIT TIME (in days)				
CN	DS	HU	50	54	89	WASH	DEPAINT	W/E/A	PAINT	TOTAL
1	FC		0.00	0.81	0.57	0.2	2.1	2.0	1.2	5.8
1	AH		0.00	0.81	0.57	0.2	2.1	2.2	1.4	6.0
1	LQ		0.00	0.81	0.57	0.2	2.1	2.6	1.3	6.2
1	SP		0.00	0.81	0.57	0.1	2.5	0.8	1.2	4.6
2	FC		0.69	0.57	0.42	0.3	1.5	1.5	0.7	4.0
2	AH		0.68	0.57	0.42	0.3	1.6	1.4	0.7	3.9
2	LQ		0.69	0.56	0.42	0.3	1.5	1.6	0.7	4.1
2	SP		0.68	0.57	0.42	0.2	1.8	1.0	0.7	3.7
3	FC		0.72	0.57	0.38	0.3	1.5	1.5	0.5	3.9
3	AH		0.73	0.57	0.38	0.3	1.6	1.4	0.5	3.8
3	LQ		0.73	0.57	0.38	0.3	1.5	1.6	0.6	3.9
3	SP		0.73	0.57	0.38	0.2	1.8	1.0	0.5	3.6
5	FC	FF	0.75	0.58	0.33	0.1	1.5	0.6	0.4	2.6
5	AH	FF	0.75	0.59	0.34	0.1	1.5	0.5	0.4	2.6
5	LQ	FF	0.76	0.59	0.33	0.1	1.5	0.7	0.4	2.8
5	SP	FF	0.75	0.58	0.34	0.0	1.7	0.4	0.4	2.6
5	FC	MU	0.77	0.60	0.29	0.1	1.7	0.7	0.6	3.2
5	AH	MU	0.78	0.60	0.30	0.1	1.5	0.5	1.0	3.2
5	LQ	MU	0.77	0.60	0.30	0.1	1.7	0.8	0.6	3.2
5	SP	MU	0.76	0.60	0.31	0.1	1.9	0.4	0.5	3.0
6	FC	FF	0.58	0.58	0.53	0.0	0.8	0.3	0.0	1.2
6	AH	FF	0.56	0.56	0.56	0.0	0.6	0.3	0.0	1.0
6	LQ	FF	0.56	0.56	0.55	0.0	0.5	0.3	0.1	1.0
6	SP	FF	0.56	0.56	0.56	0.0	0.5	0.3	0.0	0.9
6	FC	MU	0.56	0.56	0.56	0.0	0.8	0.3	0.0	1.1
6	AH	MU	0.56	0.56	0.56	0.0	0.6	0.3	0.1	1.0
6	LQ	MU	0.56	0.56	0.56	0.0	0.5	0.3	0.1	1.0
6	SP	MU	0.56	0.56	0.56	0.0	0.5	0.3	0.0	0.9

CN = Facility Configuration Option
DS = Dispatching Rule
FC = FCFS
AH = AHEAD
LQ = LNQ
SP = SPT

HU = Hangar Utilization
FF = First Freed
MU = Minimum Utilization

Table A.9 Time of Last Completion (Arrivals at T=0)

OPTION			Time of Last Completion				
CN	DS	HU	ALL	C-130	C-141	CW	SL
1	FC		966.8	616.4	766.8	932.9	963.5
1	AH		963.7	613.9	963.7	927.9	962.1
1	LQ		971.2	617.5	971.2	942.6	967.3
1	SP		962.8	606.9	962.8	936.5	955.6
2	FC		955.4	619.2	955.4	917.7	951.8
2	AH		951.0	619.8	951.0	923.2	950.3
2	LQ		963.4	619.4	963.4	940.3	955.2
2	SP		954.8	619.2	954.8	929.0	950.1
3	FC		955.0	620.6	955.0	924.8	952.3
3	AH		952.6	620.2	952.6	928.9	949.5
3	LQ		954.6	621.7	954.6	930.1	949.4
3	SP		954.6	629.6	954.6	919.4	951.1
5	FC	FF	956.3	609.7	956.3	920.8	951.6
5	AH	FF	952.8	610.0	952.8	923.6	950.7
5	LQ	FF	953.2	611.6	953.2	920.0	950.5
5	SP	FF	953.3	613.0	953.3	921.0	951.3
5	FC	MU	958.1	618.3	958.1	922.5	953.6
5	AH	MU	959.0	613.1	959.0	933.3	955.6
5	LQ	MU	956.7	613.7	956.7	927.6	952.4
5	SP	MU	954.6	616.3	954.6	925.8	949.9
6	FC	FF	954.2	603.3	954.2	921.6	953.3
6	AH	FF	958.3	603.0	958.3	922.7	955.0
6	LQ	FF	952.5	601.0	952.5	925.4	948.9
6	SP	FF	954.0	602.3	954.0	920.2	949.9
6	FC	MU	958.4	601.0	958.4	920.3	954.3
6	AH	MU	958.3	603.0	958.3	922.6	955.0
6	LQ	MU	952.5	601.0	952.5	925.4	948.9
6	SP	MU	954.0	602.3	954.0	920.2	949.9

CN = Facility Configuration Option
DS = Dispatching Rule
FC = FCFS
AH = AHEAD
LQ = LNQ
SP = SPT

HU = Hangar Utilization
FF = First Freed
MU = Minimum Utilization

ALL PAINT = All Aircraft requiring Paint
ALL = All Aircraft (C-141 and C-130)
C-141 Paint = C-141 AC requiring Paint

CW = C-141 Center Wing AC
SL = All C-141 speedline AC
(SL, SL-Paint, SL-PDM, SL-PDM-Paint)

Table A.10 Time in System and Throughput Data (Arrivals at T=0, MOG Comstraints Removed)

OPTION			TIME IN SYSTEM (in days)					NUMBER COMPLETED (by FY93)				
CN	DS	HU	ALL PAINT	ALL	C-130	C-141	C-141 PAINT	ALL	C-130	C-141	CW	SL
1	FC		744.6	569.4	634.8	554.4	800.2	160.5	35.6	124.9	4.7	120.4
1	AH		619.3	499.0	341.8	535.2	759.6	177.5	44.0	133.5	4.8	128.8
1	LQ		677.6	531.2	503.6	537.6	765.6	176.1	43.5	132.7	5.0	128.0
1	SP		619.1	498.7	334.8	536.5	762.9	177.5	44.0	133.5	5.0	129.8
2	FC		613.4	485.2	431.1	497.7	711.3	178.6	44.0	134.6	5.0	129.8
2	AH		617.9	488.3	431.6	501.4	717.3	178.3	44.0	134.3	5.0	129.4
2	LQ		610.7	484.9	428.2	497.9	708.0	178.5	44.0	134.5	4.9	130.0
2	SP		578.3	467.7	337.5	497.7	706.7	177.9	44.0	133.9	5.0	129.1
3	FC		600.9	480.2	432.1	491.2	690.6	186.0	44.0	142.0	5.1	137.2
3	AH		604.5	480.3	431.6	491.5	697.1	186.1	44.0	142.1	5.1	137.4
3	LQ		597.9	477.7	427.8	489.2	688.6	185.7	44.0	141.7	5.1	136.9
3	SP		566.1	461.3	337.4	489.8	688.1	185.9	44.0	141.9	5.2	136.9
5	FC	FF	629.9	507.0	411.0	529.1	740.5	183.8	44.0	139.8	5.1	135.2
5	AH	FF	603.4	492.2	334.9	528.5	739.2	183.7	44.0	139.7	5.1	134.7
5	LQ	FF	626.8	505.5	402.6	529.2	740.2	183.6	44.0	139.6	5.1	134.8
5	SP	FF	603.8	492.7	334.8	529.1	713.8	183.4	44.0	139.4	5.1	134.6
5	FC	MU	623.2	509.3	411.7	531.8	743.7	182.5	44.0	138.5	5.1	133.9
5	AH	MU	600.0	489.4	334.9	525.0	714.1	185.1	44.0	141.1	5.0	136.4
5	LQ	MU	623.3	502.0	402.2	525.0	735.1	185.8	44.0	141.8	5.0	137.1
5	SP	MU	599.0	488.3	334.8	523.7	732.6	186.2	44.0	142.2	5.2	137.4
6	FC	FF	605.3	495.3	333.2	532.7	742.9	182.5	44.0	138.5	5.0	133.8
6	AH	FF	607.2	496.4	338.9	532.6	742.9	182.7	44.0	138.7	5.2	133.7
6	LQ	FF	611.8	498.6	355.1	531.7	741.6	183.1	44.0	139.1	5.1	134.4
6	SP	FF	604.1	494.1	331.6	531.6	741.9	182.8	44.0	138.8	5.0	134.0
6	FC	MU	605.3	495.3	333.2	532.7	742.9	182.5	44.0	138.5	5.0	133.8
6	AH	MU	607.2	496.4	338.9	532.6	742.9	182.7	44.0	138.7	5.2	133.7
6	LQ	MU	611.8	498.6	355.1	531.7	741.6	183.1	44.0	139.1	5.1	134.4
6	SP	MU	604.1	494.1	331.6	531.6	741.9	182.8	44.0	138.8	5.0	134.0

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SP = SPT

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FF = First Freed
MU = Minimum Utilization

ALL PAINT = All Aircraft requiring Paint
ALL = All Aircraft (C-141 and C-130)
C-141 Paint = C-141 AC requiring Paint

CW = C-141 Center Wing AC
SL = All C-141 speedline AC
(SL, SL-Paint, SL-PDM, SL-PDM-Paint)

Table A.11 Utilization Rates and Wait Times Data (Arrivals at T=0, MOG Constraints Removed)

OPTION			UTILIZATION RATE			WAIT TIME (in days)				
CN	DS	HU	50	54	89	WASH	DEPAINT	W/E/A	PAINT	TOTAL
1	FC		0.00	0.64	0.51	20.1	119.6	17.2	43.6	201.1
1	AH		0.00	0.65	0.52	0.2	132.5	0.5	9.3	143.1
1	LQ		0.00	0.66	0.52	10.3	119.2	17.7	11.5	173.8
1	SP		0.00	0.62	0.49	0.2	132.1	0.3	8.0	140.9
2	FC		0.52	0.51	0.38	10.8	71.2	5.1	11.1	98.5
2	AH		0.52	0.49	0.38	10.8	73.0	4.6	11.2	99.9
2	LQ		0.51	0.51	0.38	11.3	71.4	5.5	9.4	98.8
2	SP		0.51	0.51	0.38	0.3	77.3	1.0	7.9	86.7
3	FC		0.63	0.51	0.27	10.9	71.5	5.2	4.2	92.0
3	AH		0.64	0.50	0.27	10.8	72.9	4.6	4.2	92.8
3	LQ		0.63	0.51	0.27	11.2	71.1	5.6	2.5	91.5
3	SP		0.63	0.51	0.27	0.3	77.9	1.0	0.8	80.1
5	FC	FF	0.61	0.47	0.29	11.1	84.3	3.8	3.6	103.1
5	AH	FF	0.58	0.48	0.31	0.1	89.9	0.2	0.9	91.5
5	LQ	FF	0.61	0.47	0.28	3.6	83.8	9.6	5.3	117.8
5	SP	FF	0.58	0.48	0.31	0.1	90.6	0.2	0.9	92.1
5	FC	MU	0.62	0.49	0.26	0.1	90.4	0.2	1.0	92.0
5	AH	MU	0.57	0.49	0.32	0.1	90.2	0.2	1.0	91.9
5	LQ	MU	0.57	0.49	0.31	3.5	83.6	9.5	5.4	117.7
5	SP	MU	0.57	0.49	0.32	0.1	90.4	0.2	1.0	92.0
6	FC	FF	0.53	0.53	0.30	0.2	79.5	0.3	0.2	80.4
6	AH	FF	0.45	0.45	0.45	0.2	57.1	0.1	1.5	59.0
6	LQ	FF	0.45	0.45	0.45	3.9	52.7	0.3	0.5	60.2
6	SP	FF	0.45	0.45	0.45	0.1	43.9	0.1	0.1	44.4
6	FC	MU	0.48	0.48	0.40	0.2	79.5	0.3	0.2	80.4
6	AH	MU	0.45	0.45	0.45	0.2	57.1	0.1	1.5	59.0
6	LQ	MU	0.45	0.45	0.45	3.9	52.7	0.3	0.5	60.2
6	SP	MU	0.45	0.45	0.45	0.1	46.9	0.1	0.1	44.4

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Table A.12 Time of Last Completion (Arrivals at T=0, MOG Constraints Removed)

OPTION			Time of Last Completion				
CN	DS	HU	ALL	C-130	C-141	CW	SL
1	FC		983.4	977.6	983.4	972.9	980.8
1	AH		965.2	616.5	965.2	953.9	947.3
1	LQ		956.9	741.5	956.9	941.9	951.9
1	SP		1018.0	578.4	1018.0	1018.0	946.4
2	FC		960.7	574.2	960.7	907.0	956.5
2	AH		956.8	574.1	956.8	912.9	953.3
2	LQ		961.9	574.0	961.9	915.2	958.5
2	SP		963.6	574.2	963.6	924.6	960.0
3	FC		959.5	574.2	959.5	912.7	957.4
3	AH		953.2	574.9	953.2	908.0	950.1
3	LQ		958.9	574.3	958.9	913.5	955.9
3	SP		962.0	574.7	962.0	912.1	960.6
5	FC	FF	963.7	575.2	963.7	921.9	961.0
5	AH	FF	960.0	574.8	960.0	925.3	956.9
5	LQ	FF	960.9	577.3	960.9	920.6	960.7
5	SP	FF	961.1	575.9	961.1	921.0	958.4
5	FC	MU	968.6	575.6	968.6	925.6	966.3
5	AH	MU	957.3	574.6	957.3	936.5	950.1
5	LQ	MU	957.5	577.8	957.5	937.7	953.3
5	SP	MU	955.5	574.8	955.5	922.1	952.3
6	FC	FF	972.1	571.6	972.1	928.7	996.5
6	AH	FF	967.9	571.6	967.9	923.0	967.7
6	LQ	FF	970.4	571.8	970.4	919.8	969.0
6	SP	FF	971.4	571.7	971.4	917.7	970.5
6	FC	MU	972.1	571.6	972.1	928.7	969.5
6	AH	MU	967.9	571.6	967.9	923.0	967.7
6	LQ	MU	970.4	571.8	970.4	919.8	969.0
6	SP	MU	971.4	571.7	971.4	917.7	970.5

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LQ = LNQ
SP = SPT

HU = Hangar Utilization
FF = First Freed
MU = Minimum Utilization

ALL PAINT = All Aircraft requiring Paint
ALL = All Aircraft (C-141 and C-130)
C-141 Paint = C-141 AC requiring Paint

CW = C-141 Center Wing AC
SL = All C-141 speedline AC
(SL, SL-Paint, SL-PDM, SL-PDM-Paint)

Table A.13 Time in System and Throughput Data (Exponential ArrivalRate, Increase # Paint AC)

OPTION			TIME IN SYSTEM (in days)					NUMBER COMPLETED (by FY93)				
CN	DS	HU	ALL PAINT	ALL	C-130	C-141	C-141 PAINT	ALL	C-130	C-141	CW	SL
1	FC		157.2	146.7	127.8	151.0	166.8	155.4	38.0	117.4	4.9	112.6
1	AH		158.7	147.9	124.5	153.3	169.9	155.6	38.2	117.3	4.8	112.8
1	LQ		156.9	146.7	137.1	148.9	163.4	155.9	37.0	118.9	4.9	114.1
1	SP		145.0	137.3	104.8	144.8	158.2	157.5	41.0	116.5	5.0	111.7
2	FC		137.3	132.4	109.0	137.7	146.5	166.6	39.8	126.8	5.2	121.8
2	AH		135.1	130.5	109.3	135.4	143.5	168.1	41.2	126.9	5.1	122.1
2	LQ		136.9	131.7	109.0	136.9	146.0	166.3	39.9	126.5	5.0	121.7
2	SP		133.5	129.2	107.5	134.2	142.0	167.8	39.6	128.2	5.0	123.6
3	FC		136.4	131.6	109.4	136.8	145.2	167.4	40.3	127.1	5.1	122.3
3	AH		134.5	129.9	109.3	134.7	142.8	168.0	40.3	127.7	5.0	122.9
3	LQ		136.5	131.6	109.7	136.6	145.3	166.7	40.0	126.7	5.0	121.8
3	SP		132.9	128.5	108.7	133.1	140.8	168.6	39.7	128.9	5.1	124.0
5	FC	FF	134.0	130.0	109.7	134.7	141.9	167.8	39.5	128.3	5.1	123.4
5	AH	FF	133.7	129.5	109.6	134.1	141.5	167.5	39.0	128.5	5.0	123.7
5	LQ	FF	135.2	130.8	111.8	135.1	142.9	166.3	38.5	127.8	5.0	122.9
5	SP	FF	131.8	127.8	106.8	132.7	140.0	170.0	40.7	129.3	5.1	124.6
5	FC	MU	136.8	132.0	113.6	136.3	144.4	165.4	38.3	127.1	5.0	122.3
5	AH	MU	138.8	133.5	117.7	137.2	145.7	165.6	39.2	126.4	5.0	121.7
5	LQ	MU	137.0	132.2	116.6	135.7	143.6	167.6	39.6	128.0	5.1	123.1
5	SP	MU	134.6	130.0	113.2	133.9	141.5	168.7	40.7	128.0	5.0	123.3
6	FC	FF	127.6	125.2	102.4	130.5	135.8	171.0	40.3	130.7	5.2	125.8
6	AH	FF	127.9	125.7	102.3	131.0	136.3	170.8	40.4	130.3	5.0	125.5
6	LQ	FF	127.1	124.8	102.2	130.1	135.2	172.3	40.7	131.6	5.0	126.8
6	SP	FF	127.1	124.7	102.6	129.8	135.1	171.4	40.7	130.7	4.9	126.0
6	FC	MU	127.8	125.3	102.2	130.6	136.2	170.8	40.7	130.1	5.1	125.2
6	AH	MU	127.9	125.7	102.3	131.0	136.3	170.8	40.4	130.3	5.0	125.5
6	LQ	MU	127.1	124.8	102.2	130.1	135.2	172.3	40.7	131.6	5.0	126.8
6	SP	MU	127.3	124.9	102.6	130.0	135.4	171.0	40.5	130.5	4.9	125.9

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ALL PAINT = All Aircraft requiring Paint
ALL = All Aircraft (C-141 and C-130)
C-141 Paint = C-141 AC requiring Paint

CW = C-141 Center Wing AC
SL = All C-141 speedline AC (SL, SL-Paint, SL-PDM, SL-PDM-Paint)

Table A.14 Utilization Rates and Wait Times Data (Exponential Arrival Rate, Increase # Paint AC)

OPTION			UTILIZATION RATE			WAIT TIME (in days)				
CN	DS	HU	50	54	89	WASH	DEPAINT	W/E/A	PAINT	TOTAL
1	FC		0.00	0.97	0.70	0.1	16.0	1.5	3.2	20.9
1	AH		0.00	0.96	0.70	0.8	10.4	15.1	4.6	31.2
1	LQ		0.00	0.96	0.70	2.0	9.6	12.3	4.3	29.9
1	SP		0.00	0.96	0.70	0.1	16.0	1.5	2.2	21.0
2	FC		0.68	0.77	0.60	0.3	4.0	4.8	2.7	11.9
2	AH		0.67	0.78	0.60	0.3	4.2	3.6	2.6	10.8
2	LQ		0.68	0.78	0.60	0.3	309	5.2	2.6	12.1
2	SP		0.68	0.77	0.60	0.2	5.3	1.5	1.9	9.0
3	FC		0.74	0.78	0.54	0.2	5.6	1.6	1.3	8.8
3	AH		0.74	0.78	0.53	0.3	4.2	3.7	1.6	10.0
3	LQ		0.75	0.78	0.54	0.3	3.9	5.2	1.7	11.3
3	SP		0.74	0.78	0.54	0.2	5.6	1.6	1.3	8.8
5	FC	FF	0.86	0.78	0.42	0.2	3.9	3.6	1.3	9.1
5	AH	FF	0.85	0.78	0.43	0.2	4.1	3.1	1.4	8.9
5	LQ	FF	0.87	0.78	0.41	0.3	4.0	4.3	1.2	10.0
5	SP	FF	0.82	0.79	0.45	0.1	5.4	1.0	1.1	7.6
5	FC	MU	0.90	0.79	0.34	0.3	4.7	4.6	2.0	11.8
5	AH	MU	0.91	0.79	0.33	0.3	4.9	4.7	2.8	12.8
5	LQ	MU	0.91	0.79	0.33	0.4	4.5	4.4	1.8	11.4
5	SP	MU	0.89	0.80	0.37	0.1	6.3	1.3	1.7	9.6
6	FC	FF	0.71	0.71	0.67	0.1	1.3	1.2	0.1	2.7
6	AH	FF	0.70	0.70	0.70	0.1	1.3	1.0	0.1	2.6
6	LQ	FF	0.70	0.70	0.70	0.1	0.9	1.3	0.2	2.5
6	SP	FF	0.70	0.70	0.70	0.0	0.9	1.5	0.1	2.5
6	FC	MU	0.69	0.69	0.69	0.1	1.3	1.1	0.1	2.7
6	AH	MU	0.70	0.79	0.70	0.1	1.3	1.0	0.1	2.6
6	LQ	MU	0.70	0.70	0.70	0.1	0.9	1.3	0.2	2.5
6	SP	MU	0.70	0.70	0.70	0.0	0.9	1.5	0.0	2.4

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Table A.15 Time of Last Completion (Exponential Arrival Rate, Increase # Paint AC)

OPTION			Time of Last Completion				
CN	DS	HU	ALL	C-130	C-141	CW	SL
1	FC		1100.0	886.3	1083.0	991.3	1057.0
1	AH		1082.0	838.2	1076.0	991.6	1071.0
1	LQ		1060.0	959.1	1045.0	969.2	1042.0
1	SP		1111.0	789.7	1099.0	974.6	1087.0
2	FC		995.3	812.9	986.3	933.2	983.2
2	AH		995.0	780.2	981.4	935.5	977.4
2	LQ		989.3	804.1	978.8	935.8	977.3
2	SP		1021.0	825.7	999.4	948.3	979.2
3	FC		986.7	794.5	980.3	931.6	978.1
3	AH		993.8	818.4	978.8	935.4	972.8
3	LQ		995.6	811.0	985.6	930.9	984.4
3	SP		991.1	808.1	976.3	920.5	975.4
5	FC	FF	988.3	935.7	976.6	931.7	971.5
5	AH	FF	1212.0	937.9	992.2	938.1	974.5
5	LQ	FF	991.8	933.3	982.7	933.2	977.4
5	SP	FF	976.2	780.6	971.6	924.4	967.9
5	FC	MU	1005.0	844.8	986.2	944.8	973.3
5	AH	MU	1004.0	842.3	980.3	933.3	977.2
5	LQ	MU	1003.0	854.6	971.8	932.6	969.5
5	SP	MU	989.6	806.4	981.1	932.7	978.8
6	FC	FF	977.4	799.7	965.4	919.2	959.5
6	AH	FF	973.6	784.5	964.2	930.1	958.6
6	LQ	FF	968.9	790.1	963.9	930.6	953.6
6	SP	FF	968.4	775.4	963.6	936.1	952.5
6	FC	MU	981.0	803.9	971.0	931.5	967.2
6	AH	MU	973.6	784.5	964.2	930.1	958.6
6	LQ	MU	968.9	790.1	963.9	930.6	953.6
6	SP	MU	1001.0	784.9	994.4	966.6	953.8

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ALL = All Aircraft (C-141 and C-130)
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(SL, SL-Paint, SL-PDM, SL-PDM-Paint)

Appendix B: Additional Analysis

This appendix provides the analysis of arrival rate at time zero data and the data from the system with an increased number of aircraft requiring paint as described in Section 5.

B.1 All aircraft available at T=0. Table B.1 presents the simulation output results given all aircraft are available to enter the system at T=0 (based on 30 simulation runs per configuration option/dispatching technique option). Figures B.1 and B.2 provide this data in graphical format. Aircraft throughput and wait times are defined in Section 5.2.1. Table B.2 provides the facility utilization rates for this arrival rate assumption.

Table B.1 Simulation Results for Arrivals at T=0

Option	Dispatching Rule	ave. Aircraft Throughput (# AC)	ave Wait Time (days)
1			
	FCFS	178.4	5.8
	AHEAD	178.7	6.0
	LNQ	178.8	6.2
	SPT	178.3	4.6
2			
	FCFS	180.2	4.0
	AHEAD	179.6	3.9
	LNQ	178.8	4.1
	SPT	179.6	3.7
3			
	FCFS	179.4	3.9
	AHEAD	179.7	3.8
	LNQ	179.6	3.9
	SPT	179.9	3.6
5			
	FCFS	179.8	2.6
	AHEAD	179.1	2.6
	LNQ	179.6	2.8
	SPT	178.7	2.6
6			
	FCFS	178.7	1.2
	AHEAD	178.9	1.0
	LNQ	179.1	1.0
	SPT	178.7	0.9

Table B.2 Facility Utilization Rates
(Arrivals at T=0)

Configuration Option	Facility Utilization Rate		
	Bldg 50	Bldg 54	Bldg 89
1	N/A	0.81	0.57
2	0.69	0.57	0.42
3	0.73	0.57	0.38
5	0.75	0.59	0.34
6	0.56	0.56	0.56

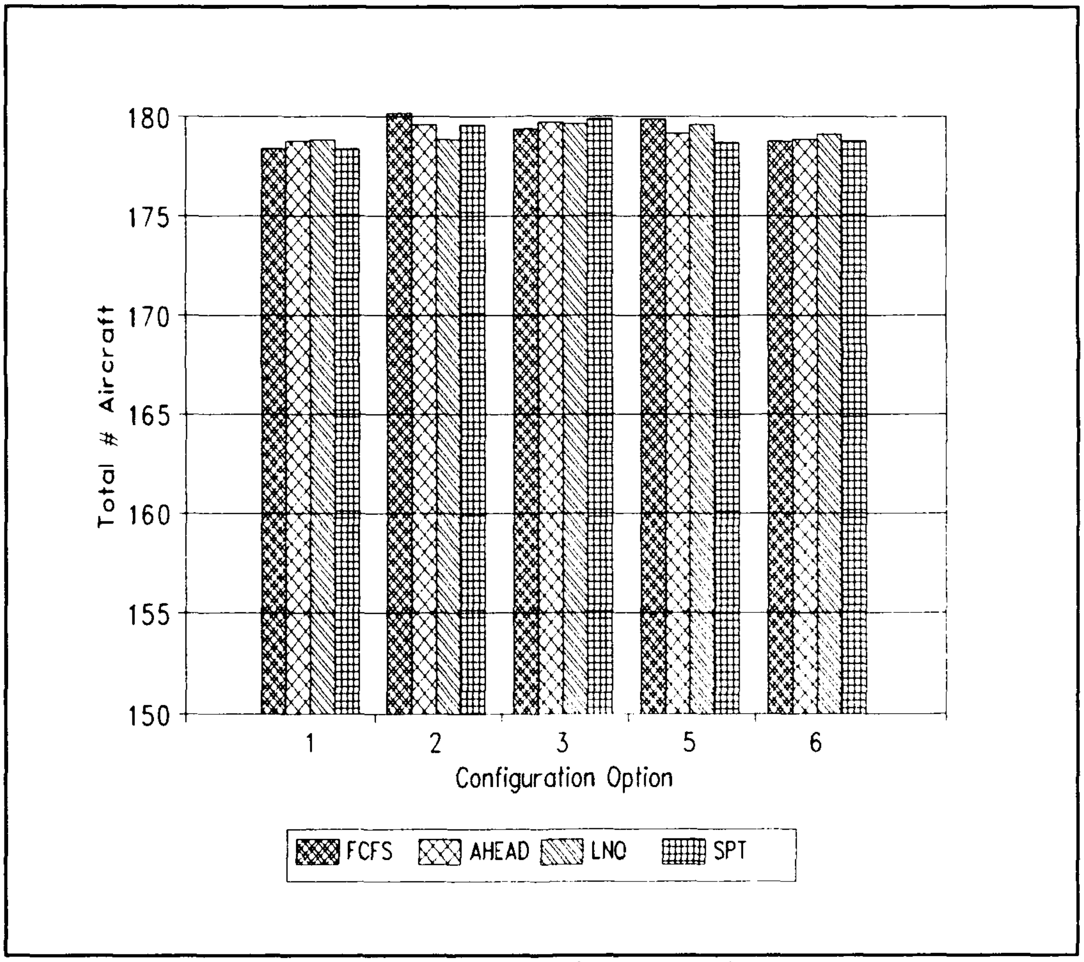


Figure B.1 Configuration Option vs Aircraft Throughput
(Arrivals @ T=0)

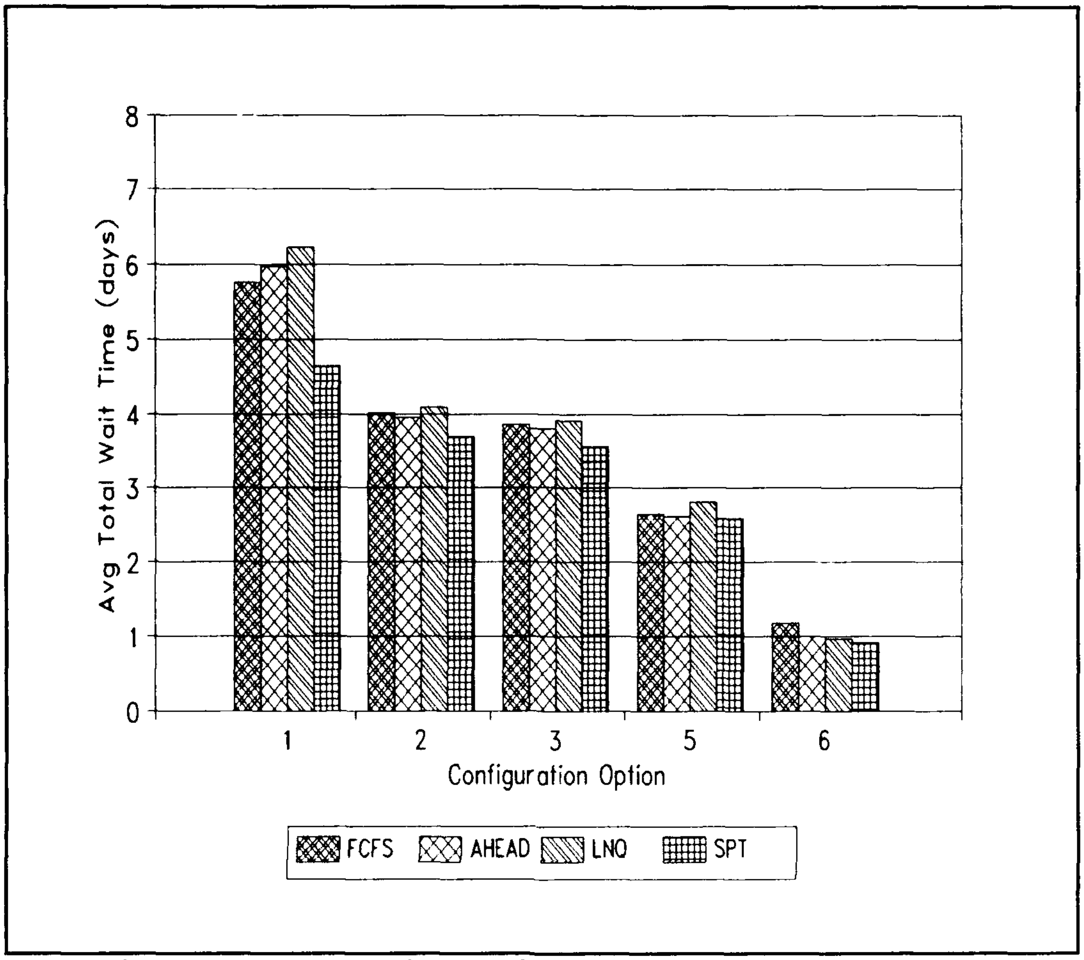


Figure B.2 Configuration Options vs Wait Time (Arrivals @T=0)

B.1.1 Analysis of Results on Aircraft Throughput. As can best be shown by Figure B.1, the investigated factors (configuration option and dispatching rules) have minimal, if any, impact on aircraft throughput. A complete analysis (As described in Chapter 4) was performed on the output data and provided in Appendix D. The results of this analysis are summarized below.

Interaction effects were considered and found to not be

significant. The main factor effects were next tested for significance and, as with the exponential arrival process, only the main configuration option effect on aircraft throughput was found to be significant.

The Tukey groupings showing main factor effects of configuration option and dispatching rules on aircraft throughput are shown in Table B.3 and B.4, respectively. Means with the same Tukey grouping letter are determined to not be significantly different from each other.

Table B.3 Main Configuration Option Effect on Aircraft Throughput (Arrivals at T=0)

Tukey Grouping		Mean Aircraft Throughput (# of AC)	Configuration Option
	C	178.55	1
B	A	179.54	2
	A	179.63	3
B	A	179.31	5
B	C	178.85	6

Means with the same letter are not significantly different

Table B.4 Main Dispatching Rule Effect on Aircraft Throughput (Arrivals at T=0)

Tukey Grouping	Mean Aircraft Throughput (# of AC)	Dispatching Rule
A	179.29	FCFS
A	179.19	AHEAD
A	179.17	LNQ
A	179.05	SPT

Means with the same letter are not significantly different

The rationale for these results can be attributed to the accelerated arrival rate of aircraft into the system as demonstrated by facility utilization rates presented in Table B.2.

B.1.2 Analysis of Results on Aircraft Wait Times.

From the statistical analysis, interaction effects were found to be significant, however they are determined to be unimportant (differences found to be very small). Main factor effects for both configuration option and dispatching rule are found to be significant.

Tukey groupings of main factor effects are presented for configuration option and dispatching rules in Table B.5 and B.6 respectively.

Table B.5 Main Configuration Option Effect on Wait Time (Arrivals at T=0)

Tukey Grouping	Wait Time (days/AC)	Configuration Option
A	5.65	1
B	3.93	2
C	3.79	3
D	2.66	5
E	1.01	6

Means with the same letter are not significantly different

Table B.6 Main Dispatching Rule Effect on Wait Time (Arrivals at T=0)

Tukey Grouping	Wait Time (days/AC)	Configuration Option
B	3.49	FCFS
B	3.46	AHEAD
A	3.60	LNQ
C	3.07	SPT

Means with the same letter are not significantly different

The wait time results differ only slightly from those obtained under the exponential arrival rate assumption. A statistical difference is now found between configuration Options 2 and 3, however this difference is assumed unimportant (0.14 days). Differences are again found for dispatching rule levels and, as with the exponential arrival rate, are assumed unimportant (0.53 days in worst case scenario).

B.2 Increased pressure on Paint/Depaint Facilities. To increase the pressure on the system and to further evaluate the effects of configuration options and dispatching techniques, the number of aircraft requiring paint is increased in the simulation model. The total number of aircraft entering the system remains at 235, however the total number to undergo the paint/depaint process increases from 131 to 179. Arrival rates for this analysis are assumed to be exponentially distributed. Table B.7 presents the output results. Figures B.3 and B.4 present this data in graphical format. Table B.8 presents the facility utilization rates across each dispatching rule. Simulation output results including times in system, completion times, facility utilization, as well as further breakouts of presented data are available in Appendix D.

Table B.7 Simulation results for Increased # of SL-Paint Aircraft

Option	Dispatching Rule	ave. Aircraft Throughput (# AC)	ave Wait Time (days)
1			
	FCFS	155.4	20.9
	AHEAD	155.6	31.2
	LNQ	155.9	29.9
	SPT	157.5	21.0
2			
	FCFS	166.6	11.9
	AHEAD	168.1	10.8
	LNQ	166.3	12.1
	SPT	167.8	9.0
3			
	FCFS	167.4	8.8
	AHEAD	168.0	10.0
	LNQ	166.7	11.3
	SPT	168.6	8.8
5			
	FCFS	167.8	9.1
	AHEAD	167.5	8.9
	LNQ	166.3	10.0
	SPT	170.0	7.6
6			
	FCFS	171.0	2.7
	AHEAD	170.8	2.6
	LNQ	172.3	2.5
	SPT	171.4	2.5

Table B.8 Facility Utilization Rates
(EXP Arrivals, Increased # of Paint AC)

Configuration Option	Facility Utilization Rate		
	Bldg 50	Bldg 54	Bldg 89
1	N/A	0.96	0.70
2	0.68	0.78	0.60
3	0.74	0.78	0.54
5	0.86	0.78	0.43
6	0.70	0.70	0.70

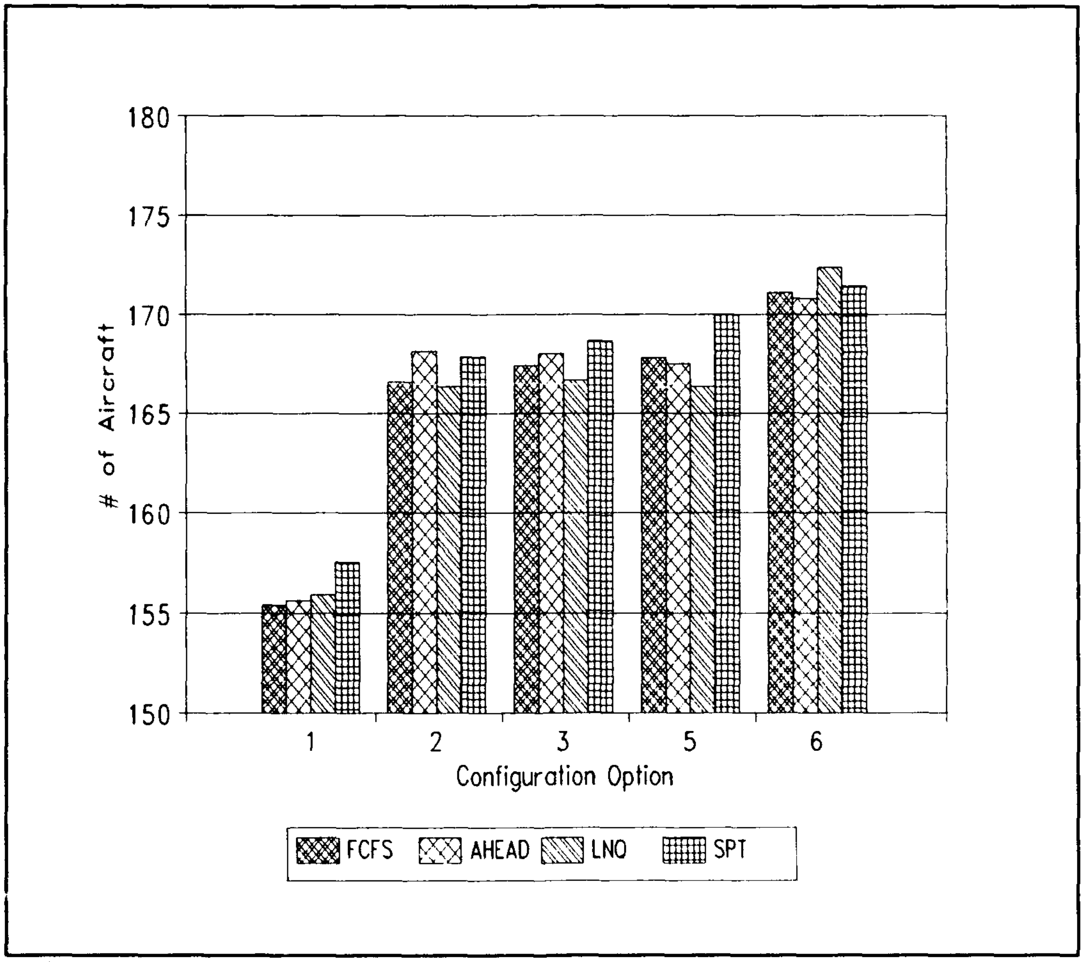


Figure B.3 Configuration Option vs Aircraft Throughput (EXP Arrivals), Increase in # Paint Aircraft

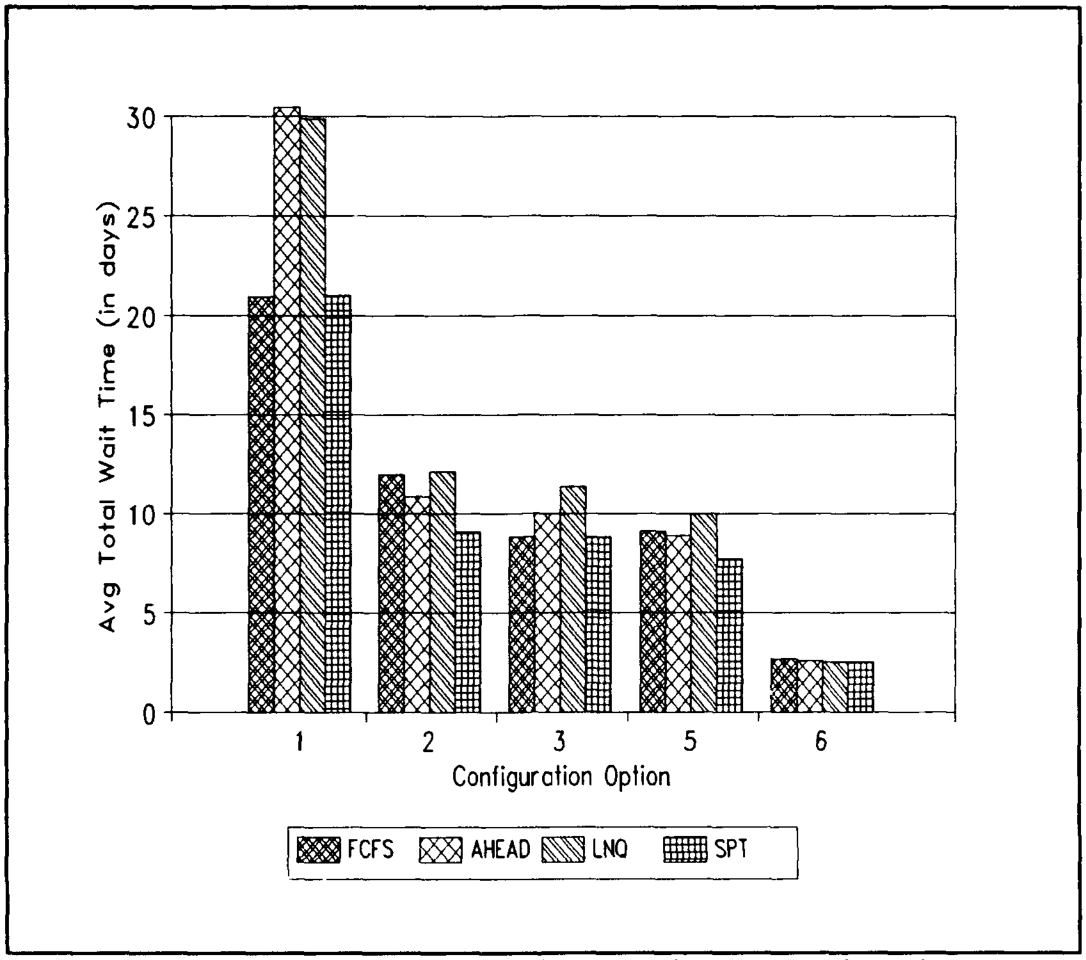


Figure B.4 Configuration Option vs Wait Time (EXP Arrivals), Increase in # Paint Aircraft

B.2.1 Analysis of Results on Aircraft Throughput. As shown in Figures B.3 and B.4, a more distinct correlation is demonstrated between aircraft throughput and configuration option. From the statistical analysis, interaction effects are found to be significant on aircraft throughput, however they are considered unimportant. Main factor effects for both configuration option and dispatching

rule are, however, found to be significant.

No statistical significance is found on differences in effect of configuration options 2, 3 or 5 on aircraft throughput. Differences are found between this grouping of configuration options (2, 3, and 5) and configuration options 1 and 6. As expected, configuration option 6 provides the highest aircraft throughput, followed by the grouping of Options 2, 3, and 5, followed by Option 1.

Tukey groupings of main factor effects on aircraft throughput are presented for configuration option and dispatching rules in Table B.9 and B.10 respectively.

Table B.9 Main Configuration Option Effect on Aircraft Throughput (Arrivals at T=0, Increased # of Paint AC)

Tukey Grouping	Mean Aircraft Throughput (# of AC)	Configuration Option
C	156.08	1
B	167.21	2
B	167.67	3
B	167.90	5
A	171.90	6

Means with the same letter are not significantly different

Table B.10 Main Dispatching Rule Effect on Aircraft Throughput (Arrivals at T=0, Increased # of Paint AC)

Tukey Grouping		Mean Aircraft Throughput (# of AC)	Dispatching Rule
	B	165.63	FCFS
A	B	165.99	AHEAD
	B	165.51	LNQ
A		167.06	SPT

Means with the same letter are not significantly different

B.2.2 Analysis of Results on Wait Time. Upon initial review statistical analysis, the interaction effects on wait time are found to be significant. Upon review of these interaction effects, they are assumed unimportant. Main factor effects for both configuration option and dispatching rules on wait times are found to be significant.

Although a statistical difference does exist between configuration options 2 and 3, these differences are assumed unimportant in practical terms (0.72 days). Differences between all other configuration option effects on wait time are statistically significant and are important. As expected, configuration option 6 produces the minimum wait time (2.56 days), followed by each configuration option in descending order.

For dispatching rule level effects, FCFS, LNQ, and AHEAD provide no significant difference in effect on wait

times. However, under this increased pressure on paint/depaint facilities, the robustness of the SPT dispatching rule is demonstrated. Wait time under the SPT dispatching rule are decreased by approximately 3 days per aircraft over other investigated dispatching rules.

Tukey groupings of main factor effects on wait time are presented for configuration option and dispatching rules in Table B.11 and B.12 respectively.

Table B.11 Main Configuration Option Effect on Wait Time (Arrivals at T=0, Increased # of Paint AC)

Tukey Grouping	Wait Time (days/AC)	Configuration Option
A	28.06	1
B	10.99	2
C	10.27	3
D	8.89	5
E	2.56	6

Means with the same letter are not significantly different

Table B.12 Main Dispatching Rule Effect on Wait Time (Arrivals at T=0, Increased # of Paint AC)

Tukey Grouping	Wait Time (days/AC)	Configuration Option
A	12.66	FCFS
A	12.69	AHEAD
A	13.17	LNQ
B	9.76	SPT

Means with the same letter are not significantly different

These results conform to the expected results for the system (increase in throughput and decrease in wait time as facility capabilities increase).

Appendix C: Facility Utilization Dispatching Rules

This appendix provides a discussion of the two facility utilization dispatching techniques investigated as part of this research (as discussed in Section 3.3.7)

C.1 Dispatching Rules for Facility Utilization. In addition to the application of dispatching rules after a facility has been freed, dispatching rules are also required in the case when two or more facilities are available and capable of processing an arriving aircraft. For example, in configuration option 6, if a C-141 aircraft arrives for depaint and buildings 50, 54, and 89 are available, a dispatching rule is required to determine which facility the aircraft will enter. Two dispatching rules investigated are based on minimum utilization and maximum current idle time. These dispatching rules are executed upon arrival of an aircraft for a paint/depaint operation which more than one facility is capable of performing. These two rules were investigated in a preliminary analysis and found to have no significant difference in effect on aircraft throughput. Since the facility dispatch rule based on maximum idle time appeared to do better in terms of average wait time, it was selected as the rule and fixed for all future

investigations. The two facility utilization techniques are described below. Results of simulation runs using both facility dispatching techniques are provided in Appendix A. Figure C.1 provides a flow chart representation of these dispatching techniques.

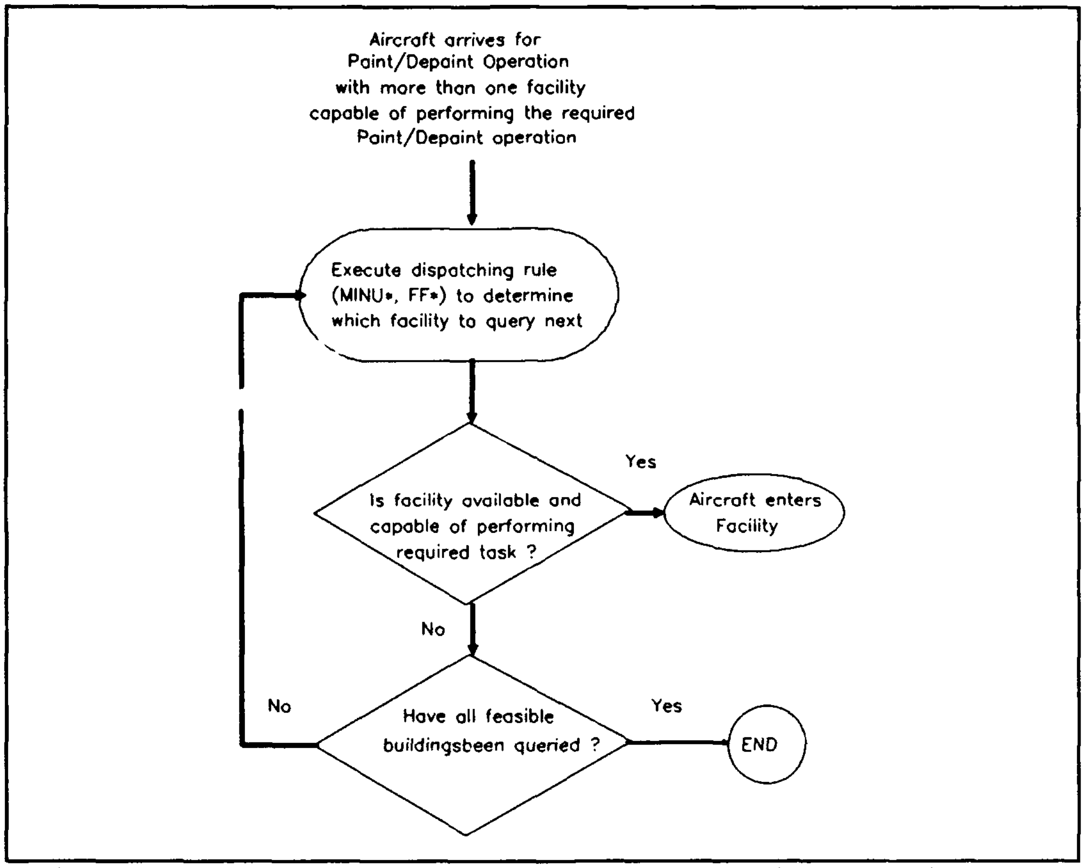


Figure C.1 Dispatching Rules for Facility Utilization

C.1.1 Minimum Utilization (MINU) Facility Dispatching Rule. The first building utilization dispatching rule investigated is based on minimum

utilization. This facility dispatching techniques attempts to evenly distribute the workload for the paint/depaint facilities. Therefore, when more than one facility is available and capable to perform the required paint/depaint operation, the facility with the smaller utilization rate is selected under this dispatching rule.

C.1.2 First Freed (FF) Facility Dispatching Rule. The second building utilization dispatching rule considered is based on longest current idle time. When an aircraft arrives for a paint/depaint operation with more than one facility available and capable of performing the operation, the facility which has been available the longest is selected.

As discussed in Chapter III, these facility dispatching techniques had no affect on aircraft throughput. The FF dispatching rule appeared to reduce wait time and was therefore fixed as the facility dispatching rule and used for all analysis presented in Chapter V.

APPENDIX D. STATISTICAL ANALYSIS RESULTS

This appendix provides the statistical analysis output for the analysis presented in Chapter V. The following analysis are presented:

General Linear Models Procedure
Class Level Information

Class	Levels	Values
OPTION	5	FIVE ONE SIX THREE TWO
DISP	4	AHEAD FCFS LNQ SPT

Number of observations in data set = 600

Exponential Arrival Rate Data
General Linear Models Procedure

Dependent Variable: THROUGHP

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	19	1162.61833	61.19044	2.18	0.0028
Error	580	16309.56667	28.11994		
Corrected Total	599	17472.18500			

R-Square	C.V.	Root MSE	THROUGHP Mean
0.066541	3.109158	5.30282	170.555

Source	DF	Type I SS	Mean Square	F Value	Pr > F
OPTION	4	671.976667	167.994167	5.97	0.0001
DISP	3	54.645000	18.215000	0.65	0.5846
OPTION*DISP	12	435.996667	36.333056	1.29	0.2186

Source	DF	Type III SS	Mean Square	F Value	Pr > F
OPTION	4	671.976667	167.994167	5.97	0.0001
DISP	3	54.645000	18.215000	0.65	0.5846
OPTION*DISP	12	435.996667	36.333056	1.29	0.2186

General Linear Models Procedure

Tukey's Studentized Range (HSD) Test for variable: THROUGHP

NOTE: This test controls the type I experimentwise error rate.

Alpha= 0.1 Confidence= 0.9 df= 580 MSE= 28.11994
Critical Value of Studentized Range= 3.487
Minimum Significant Difference= 1.6879

Comparisons significant at the 0.1 level are indicated by '***'.

OPTION Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
THREE - TWO	-1.3462	0.3417	2.0296	
THREE - SIX	-0.8629	0.8250	2.5129	
THREE - FIVE	-0.4046	1.2833	2.9712	
THREE - ONE	1.3371	3.0250	4.7129	***
TWO - THREE	-2.0296	-0.3417	1.3462	
TWO - SIX	-1.2046	0.4833	2.1712	
TWO FIVE	-0.7462	0.9417	2.6296	
TWO - ONE	0.9954	2.6833	4.3712	***
SIX - THREE	-2.5129	-0.8250	0.8629	
SIX - TWO	-2.1712	-0.4833	1.2046	
SIX - FIVE	-1.2296	0.4583	2.1462	
SIX - ONE	0.5121	2.2000	3.8879	***
FIVE - THREE	-2.9712	-1.2833	0.4046	
FIVE - TWO	-2.6296	-0.9417	0.7462	
FIVE - SIX	-2.1462	-0.4583	1.2296	
FIVE - ONE	0.0538	1.7417	3.4296	***
ONE - THREE	-4.7129	-3.0250	-1.3371	***
ONE - TWO	-4.3712	-2.6833	-0.9954	***
ONE - SIX	-3.8879	-2.2000	-0.5121	***
ONE - FIVE	-3.4296	-1.7417	-0.0538	***

General Linear Models Procedure

Tukey's Studentized Range (HSD) Test for variable: THROUGHP

NOTE: This test controls the type I experimentwise error rate, but generally has a higher type II error rate than REGWQ.

Alpha= 0.1 df= 580 MSE= 28.11994
Critical Value of Studentized Range= 3.487
Minimum Significant Difference= 1.6879

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	OPTION
A	171.6500	120	THREE
A			
A	171.3083	120	TWO
A			
A	170.8250	120	SIX
A			
A	170.3667	120	FIVE
B	168.6250	120	ONE

General Linear Models Procedure

Tukey's Studentized Range (HSD) Test for variable: THROUGHP

NOTE: This test controls the type I experimentwise error rate.

Alpha= 0.1 Confidence= 0.9 df= 580 MSE= 28.11994
Critical Value of Studentized Range= 3.248
Minimum Significant Difference= 1.4062

Comparisons significant at the 0.1 level are indicated by '***'.

DISP Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit
SPT - FCFS	-1.2862	0.1200	1.5262
SPT - AHEAD	-0.7729	0.6333	2.0395
SPT - LNQ	-0.7262	0.6800	2.0862
FCFS - SPT	-1.5262	-0.1200	1.2862
FCFS - AHEAD	-0.8929	0.5133	1.9195
FCFS - LNQ	-0.8462	0.5600	1.9662
AHEAD - SPT	-2.0395	-0.6333	0.7729
AHEAD - FCFS	-1.9195	-0.5133	0.8929
AHEAD - LNQ	-1.3595	0.0467	1.4529
LNQ - SPT	-2.0862	-0.6800	0.7262
LNQ - FCFS	-1.9662	-0.5600	0.8462
LNQ - AHEAD	-1.4529	-0.0467	1.3595

General Linear Models Procedure

Tukey's Studentized Range (HSD) Test for variable: THROUGHP

NOTE: This test controls the type I experimentwise error rate, but generally has a higher type II error rate than REGWQ.

Alpha= 0.1 df= 580 MSE= 28.11994
Critical Value of Studentized Range= 3.248
Minimum Significant Difference= 1.4062

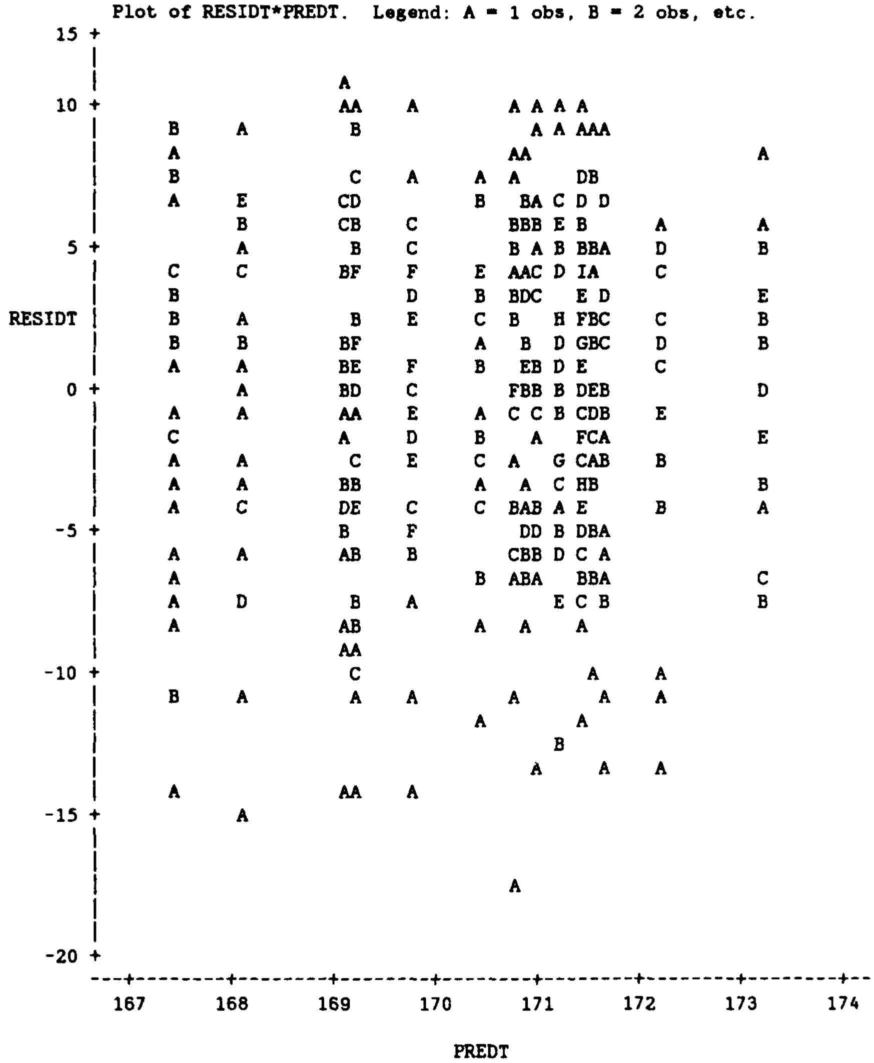
Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	DISP
A	170.9133	150	SPT
A			
A	170.7933	150	FCFS
A			
A	170.2800	150	AHEAD
A			
A	170.2333	150	LNQ

Level of OPTION	Level of DISP	N	-----------THROUGHP---------- Mean	SD
FIVE	AHEAD	30	171.666667	5.49817106
FIVE	FCFS	30	169.800000	4.70802689
FIVE	LNQ	30	169.066667	5.96503220
FIVE	SPT	30	170.933333	4.76288331
ONE	AHEAD	30	167.466667	6.39899417
ONE	FCFS	30	169.166667	5.57137594
ONE	LNQ	30	168.100000	6.23864486
ONE	SPT	30	169.766667	4.39971263
SIX	AHEAD	30	170.466667	4.81902361
SIX	FCFS	30	172.233333	4.78275158
SIX	LNQ	30	171.433333	4.20740999
SIX	SPT	30	169.166667	6.21501704
THREE	AHEAD	30	170.766667	5.93460531
THREE	FCFS	30	171.166667	5.17342902
THREE	LNQ	30	171.400000	4.20672696
THREE	SPT	30	173.266667	4.21764220
TWO	AHEAD	30	171.033333	5.35938322
TWO	FCFS	30	171.600000	4.37548027
TWO	LNQ	30	171.166667	5.03835861
TWO	SPT	30	171.433333	6.95147384

Exponential Arrival Rate Data 7

Plot of RESIDT*PREDT. Legend: A = 1 obs, B = 2 obs, etc.



General Linear Models Procedure
Class Level Information

Class	Levels	Values
OPTION	5	FIVE ONE SIX THREE TWO
DISP	4	AHEAD FCFS LNQ SPT

Number of observations in data set = 600

General Linear Models Procedure

Dependent Variable: WAITTIME

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	19	2609.38872	137.33625	247.30	0.0001
Error	580	322.09902	0.55534		
Corrected Total	599	2931.48774			

R-Square	C.V.	Root MSE	WAITTIME Mean
0.890124	19.45946	0.74521	3.82957

Source	DF	Type I SS	Mean Square	F Value	Pr > F
OPTION	4	2496.00649	624.00162	1123.63	0.0001
DISP	3	54.53745	18.17915	32.73	0.0001
OPTION*DISP	12	58.84478	4.90373	8.83	0.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
OPTION	4	2496.00649	624.00162	1123.63	0.0001
DISP	3	54.53745	18.17915	32.73	0.0001
OPTION*DISP	12	58.84478	4.90373	8.83	0.0001

General Linear Models Procedure

Tukey's Studentized Range (HSD) Test for variable: WAITTIME

NOTE: This test controls the type I experimentwise error rate.

Alpha= 0.1 Confidence= 0.9 df= 580 MSE= 0.555343
Critical Value of Studentized Range= 3.487
Minimum Significant Difference= 0.2372

Comparisons significant at the 0.1 level are indicated by '***'.

OPTION Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
ONE - TWO	2.42145	2.65865	2.89585	***
ONE - THREE	2.57478	2.81198	3.04919	***
ONE - FIVE	3.89971	4.13691	4.37411	***
ONE - SIX	6.00307	6.24028	6.47748	***
TWO - ONE	-2.89585	-2.65865	-2.42145	***
TWO - THREE	-0.08387	0.15333	0.39054	
TWO - FIVE	1.24106	1.47826	1.71546	***
TWO - SIX	3.34442	3.58163	3.81883	***
THREE - ONE	-3.04919	-2.81198	-2.57478	***
THREE - TWO	-0.39054	-0.15333	0.08387	
THREE - FIVE	1.08772	1.32492	1.56213	***
THREE - SIX	3.19109	3.42829	3.66549	***
FIVE - ONE	-4.37411	-4.13691	-3.89971	***
FIVE - TWO	-1.71546	-1.47826	-1.24106	***
FIVE - THREE	-1.56213	-1.32492	-1.08772	***
FIVE - SIX	1.86616	2.10337	2.34057	***
SIX - ONE	-6.47748	-6.24028	-6.00307	***
SIX - TWO	-3.81883	-3.58163	-3.34442	***
SIX - THREE	-3.66549	-3.42829	-3.19109	***
SIX - FIVE	-2.34057	-2.10337	-1.86616	***

General Linear Models Procedure

Tukey's Studentized Range (HSD) Test for variable: WAITTIME

NOTE: This test controls the type I experimentwise error rate, but generally has a higher type II error rate than REGWQ.

Alpha= 0.1 df= 580 MSE= 0.555343
Critical Value of Studentized Range= 3.487
Minimum Significant Difference= 0.2372

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	OPTION
A	6.99913	120	ONE
B	4.34048	120	TWO
B			
B	4.18715	120	THREE
C	2.86223	120	FIVE
D	0.75886	120	SIX

General Linear Models Procedure

Tukey's Studentized Range (HSD) Test for variable: WAITTIME

NOTE: This test controls the type I experimentwise error rate.

Alpha= 0.1 Confidence= 0.9 df= 580 MSE= 0.555343
Critical Value of Studentized Range= 3.248
Minimum Significant Difference= 0.1976

Comparisons significant at the 0.1 level are indicated by '***'.

DISP Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
LNQ - AHEAD	-0.01612	0.18149	0.37911	
LNQ - FCFS	0.00789	0.20550	0.40311	***
LNQ - SPT	0.60303	0.80065	0.99826	***
AHEAD - LNQ	-0.37911	-0.18149	0.01612	
AHEAD - FCFS	-0.17361	0.02401	0.22162	
AHEAD - SPT	0.42154	0.61915	0.81677	***
FCFS - LNQ	-0.40311	-0.20550	-0.00789	***
FCFS - AHEAD	-0.22162	-0.02401	0.17361	
FCFS - SPT	0.39753	0.59515	0.79276	***
SPT - LNQ	-0.99826	-0.80065	-0.60303	***
SPT - AHEAD	-0.81677	-0.61915	-0.42154	***
SPT - FCFS	-0.79276	-0.59515	-0.39753	***

Tukey's Studentized Range (HSD) Test for variable: WAITTIME

NOTE: This test controls the type I experimentwise error rate, but generally has a higher type II error rate than REGWQ.

Alpha= 0.1 df= 580 MSE= 0.555343
Critical Value of Studentized Range= 3.248
Minimum Significant Difference= 0.1976

Means with the same letter are not significantly different.

Tukey Grouping		Mean	N	DISP
	A	4.12648	150	LNQ
	A			
B	A	3.94499	150	AHEAD
B				
B		3.92098	150	FCFS
	C	3.32583	150	SPT

Level of OPTION	Level of DISP	N	WAITTIME Mean	WAITTIME SD
FIVE	AHEAD	30	2.71266667	0.37966195
FIVE	FCFS	30	2.93526667	0.64720742
FIVE	LNQ	30	3.02983333	0.43184273
FIVE	SPT	30	2.77113333	0.52242232
ONE	AHEAD	30	7.62133333	1.69502882
ONE	FCFS	30	7.14506667	1.21902290
ONE	LNQ	30	7.67016667	1.59480787
ONE	SPT	30	5.55996667	0.92420450
SIX	AHEAD	30	0.76493333	0.18553835
SIX	FCFS	30	0.76290000	0.17972649
SIX	LNQ	30	0.74176667	0.19570592
SIX	SPT	30	0.76583333	0.17694653
THREE	AHEAD	30	4.17383333	0.37214987
THREE	FCFS	30	4.26726667	0.55766786
THREE	LNQ	30	4.63386667	0.57421009
THREE	SPT	30	3.67363333	0.59157251
TWO	AHEAD	30	4.45216667	0.56846291
TWO	FCFS	30	4.49440000	0.46321393
TWO	LNQ	30	4.55676667	0.57223269
TWO	SPT	30	3.85860000	0.44390847

```
                  Exponential Arrival Rate Data                      14
    Plot of RESIDW*PREDW.  Legend: A = 1 obs, B = 2 obs, etc.
RESIDW             |
     5 +                                                    A
       |
       |
     4 +
       |
       |
       |                                                    A
       |                                                    A
     3 +                                                    B
       |
       |                                                A   A
       |
       |                                                A   A
     2 +
       |                                      B             A
       |                                                B   A
       |                    AA    AA   A                A   B
       |                     B    A   BAB     B         B   E
     1 +                    C A        AA     C         A
       |                    BAB   AA AADB     A             C
       |       B            AE    BA CBCE               B   A
       |       F            DAC   DB ACFL     B         B   B
       |       Z            MBC   CG EEFH     B         B   C
     0 +       Z            IBJ   EF HAJD     C         A   B
       |       Z            IFF   BE EIIF               A   E
       |       B            L B   ED DBJD     D             B
       |                    FGA   EB CAGF     D         C   A
       |                     BA    A  BAH     C         C   C
    -1 +                     AA       B B     A         A   C
       |                          A    A      A         C   F
       |                                      B         B   D
       |                                                A   B
       |                                                    B
    -2 +                                                A   C
       |
       |                                                    A
       |
       |
    -3 +
       |                                                    A
       ---+------------+------------+------------+------------+--
          0            2            4            6            8

                                  PREDW
```

NOTE: 32 obs hidden.

General Linear Models Procedure
Class Level Information

Class	Levels	Values
OPTION	5	FIVE ONE SIX THREE TWO
DISP	4	AHEAD FCFS LNQ SPT

Number of observations in data set = 600

General Linear Models Procedure

Dependent Variable: THROUGHP

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	19	163.073333	8.582807	2.02	0.0066
Error	580	2470.200000	4.258966		
Corrected Total	599	2633.273333			

	R-Square	C.V.	Root MSE	THROUGHP Mean
	0.061928	1.151783	2.06373	179.177

Source	DF	Type I SS	Mean Square	F Value	Pr > F
OPTION	4	103.023333	25.755833	6.05	0.0001
DISP	3	4.620000	1.540000	0.36	0.7808
OPTION*DISP	12	55.430000	4.619167	1.08	0.3704

Source	DF	Type III SS	Mean Square	F Value	Pr > F
OPTION	4	103.023333	25.755833	6.05	0.0001
DISP	3	4.620000	1.540000	0.36	0.7808
OPTION*DISP	12	55.430000	4.619167	1.08	0.3704

General Linear Models Procedure

Tukey's Studentized Range (HSD) Test for variable: THROUGHP

NOTE: This test controls the type I experimentwise error rate.

Alpha= 0.1 Confidence= 0.9 df= 580 MSE= 4.258966
Critical Value of Studentized Range= 3.487
Minimum Significant Difference= 0.6569

Comparisons significant at the 0.1 level are indicated by '***'.

OPTION Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
THREE - TWO	-0.5652	0.0917	0.7486	
THREE - FIVE	-0.3319	0.3250	0.9819	
THREE - SIX	0.1264	0.7833	1.4402	***
THREE - ONE	0.4264	1.0833	1.7402	***
TWO - THREE	-0.7486	-0.0917	0.5652	
TWO - FIVE	-0.4236	0.2333	0.8902	
TWO - SIX	0.0348	0.6917	1.3486	***
TWO - ONE	0.3348	0.9917	1.6486	***
FIVE - THREE	-0.9819	-0.3250	0.3319	
FIVE - TWO	-0.8902	-0.2333	0.4236	
FIVE - SIX	-0.1986	0.4583	1.1152	
FIVE - ONE	0.1014	0.7583	1.4152	***
SIX - THREE	-1.4402	-0.7833	-0.1264	***
SIX - TWO	-1.3486	-0.6917	-0.0348	***
SIX - FIVE	-1.1152	-0.4583	0.1986	
SIX - ONE	-0.3569	0.3000	0.9569	
ONE - THREE	-1.7402	-1.0833	-0.4264	***
ONE - TWO	-1.6486	-0.9917	-0.3348	***
ONE - FIVE	-1.4152	-0.7583	-0.1014	***
ONE - SIX	-0.9569	-0.3000	0.3569	

General Linear Models Procedure

Tukey's Studentized Range (HSD) Test for variable: THROUGHP

NOTE: This test controls the type I experimentwise error rate, but generally has a higher type II error rate than REGWQ.

Alpha= 0.1 df= 580 MSE= 4.258966
Critical Value of Studentized Range= 3.487
Minimum Significant Difference= 0.6569

Means with the same letter are not significantly different.

Tukey Grouping		Mean	N	OPTION
	A	179.6333	120	THREE
	A			
	A	179.5417	120	TWO
	A			
B	A	179.3083	120	FIVE
B				
B	C	178.8500	120	SIX
	C			
	C	178.5500	120	ONE

General Linear Models Procedure

Tukey's Studentized Range (HSD) Test for variable: THROUGHP

NOTE: This test controls the type I experimentwise error rate.

Alpha= 0.1 Confidence= 0.9 df= 580 MSE= 4.258966
Critical Value of Studentized Range= 3.248
Minimum Significant Difference= 0.5473

Comparisons significant at the 0.1 level are indicated by '***'.

DISP Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit
FCFS - AHEAD	-0.4473	0.1000	0.6473
FCFS - LNQ	-0.4273	0.1200	0.6673
FCFS - SPT	-0.3006	0.2467	0.7939
AHEAD - FCFS	-0.6473	-0.1000	0.4473
AHEAD - LNQ	-0.5273	0.0200	0.5673
AHEAD - SPT	-0.4006	0.1467	0.6939
LNQ - FCFS	-0.6673	-0.1200	0.4273
LNQ - AHEAD	-0.5673	-0.0200	0.5273
LNQ - SPT	-0.4206	0.1267	0.6739
SPT - FCFS	-0.7939	-0.2467	0.3006
SPT - AHEAD	-0.6939	-0.1467	0.4006
SPT - LNQ	-0.6739	-0.1267	0.4206

General Linear Models Procedure

Tukey's Studentized Range (HSD) Test for variable: THROUGHP

NOTE: This test controls the type I experimentwise error rate, but generally has a higher type II error rate than REGWQ.

Alpha= 0.1 df= 580 MSE= 4.258966
Critical Value of Studentized Range= 3.248
Minimum Significant Difference= 0.5473

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	DISP
A	179.2933	150	FCFS
A			
A	179.1933	150	AHEAD
A			
A	179.1733	150	LNQ
A			
A	179.0467	150	SPT

Level of OPTION	Level of DISP	N	THROUGHP Mean	THROUGHP SD
FIVE	AHEAD	30	179.133333	1.94286197
FIVE	FCFS	30	179.833333	2.49251754
FIVE	LNQ	30	179.566667	2.45909057
FIVE	SPT	30	178.700000	1.93248099
ONE	AHEAD	30	178.733333	1.63861450
ONE	FCFS	30	178.366667	2.12510987
ONE	LNQ	30	178.766667	1.88795334
ONE	SPT	30	178.333333	2.29442102
SIX	AHEAD	30	178.866667	2.16131080
SIX	FCFS	30	178.733333	2.19613035
SIX	LNQ	30	179.066667	1.74065650
SIX	SPT	30	178.733333	1.96404462
THREE	AHEAD	30	179.666667	1.82574186
THREE	FCFS	30	179.366667	1.67091413
THREE	LNQ	30	179.633333	2.10882110
THREE	SPT	30	179.866667	2.25500720
TWO	AHEAD	30	179.566667	2.20787514
TWO	FCFS	30	180.166667	2.13482347
TWO	LNQ	30	178.833333	1.83985257
TWO	SPT	30	179.600000	2.12700210

```
                          Arrival AT T=0 Data                         7
         Plot of RESIDT*PREDT.  Legend: A = 1 obs, B = 2 obs, etc.
     8 +
       |
       |                                       A
     6 +
       |         A
       |                                        A    A
       |
       |          A
       |                  C  A                 CB    B
     4 +                                              A      B
       |         AB
       |                 BCC A                 CEA   C
RESIDT |                      B   CD                  E      A
       |         BA                       C
       |                 DKA D                 BCF   A
     2 +                      G   CB                  C      F
       |         DD                       D
       |                 EME C                 KEC   D
       |                      B   FH                         F
       |         FF                       I
       |                 FVJ H                 KJD   D
     0 +                      G   GF                  H      C
       |         GE                       F
       |                 DKF G                 GQI   E
       |                      F   FE                  C      F
       |         CF                       C
       |                 DPA D                 KJC   D
    -2 +                      C   CC                  E      A
       |         DD                       C
       |                 DHB                   GDC   D
       |                      A   A                   D      D
       |         A                        B
       |                 ABA B                 CBA   B
    -4 +                          AA                  A      A
       |
       |                  AA                    A
       |                      A    A
       |          A
       |                                       A
    -6 +                      A
       |         A
       |
       |
    -8 +
       --+-----------+-----------+-----------+-----------+-----------+-
       178.0       178.5       179.0       179.5       180.0       180.5

                                     PREDT
```

General Linear Models Procedure
Class Level Information

Class	Levels	Values
OPTION	5	FIVE ONE SIX THREE TWO
DISP	4	AHEAD FCFS LNQ SPT

Number of observations in data set = 600

General Linear Models Procedure

Dependent Variable: WAITTIME

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	19	1458.64842	76.77097	925.21	0.0001
Error	580	48.12660	0.08298		
Corrected Total	599	1506.77502			

	P-Square	C.V.	Root MSE	WAITTIME Mean
	0.968060	8.451847	0.28806	3.40821

Source	DF	Type I SS	Mean Square	F Value	Pr > F
OPTION	4	1407.49503	351.87376	4240.62	0.0001
DISP	3	23.95886	7.98629	96.25	0.0001
OPTION*DISP	12	27.19453	2.26621	27.31	0.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
OPTION	4	1407.49503	351.87376	4240.62	0.0001
DISP	3	23.95886	7.98629	96.25	0.0001
OPTION*DISP	12	27.19453	2.26621	27.31	0.0001

General Linear Models Procedure

Tukey's Studentized Range (HSD) Test for variable: WAITTIME

NOTE: This test controls the type I experimentwise error rate.

Alpha= 0.1 Confidence= 0.9 df= 580 MSE= 0.082977
Critical Value of Studentized Range= 3.487
Minimum Significant Difference= 0.0917

Comparisons significant at the 0.1 level are indicated by '***'.

OPTION Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
ONE - TWO	1.62794	1.71963	1.81132	***
ONE - THREE	1.76910	1.86079	1.95248	***
ONE - FIVE	2.89715	2.98884	3.08053	***
ONE - SIX	4.54334	4.63503	4.72672	***
TWO - ONE	-1.81132	-1.71963	-1.62794	***
TWO - THREE	0.04947	0.14116	0.23285	***
TWO - FIVE	1.17752	1.26921	1.36090	***
TWO - SIX	2.82371	2.91540	3.00709	***
THREE - ONE	-1.95248	-1.86079	-1.76910	***
THREE - TWO	-0.23285	-0.14116	-0.04947	***
THREE - FIVE	1.03636	1.12805	1.21974	***
THREE - SIX	2.68255	2.77424	2.86593	***
FIVE - ONE	-3.08053	-2.98884	-2.89715	***
FIVE - TWO	-1.36090	-1.26921	-1.17752	***
FIVE - THREE	-1.21974	-1.12805	-1.03636	***
FIVE - SIX	1.55450	1.64619	1.73788	***
SIX - ONE	-4.72672	-4.63503	-4.54334	***
SIX - TWO	-3.00709	-2.91540	-2.82371	***
SIX - THREE	-2.86593	-2.77424	-2.68255	***
SIX - FIVE	-1.73788	-1.64619	-1.55450	***

General Linear Models Procedure

Tukey's Studentized Range (HSD) Test for variable: WAITTIME

NOTE: This test controls the type I experimentwise error rate, but generally has a higher type II error rate than REGWQ.

Alpha= 0.1 df= 580 MSE= 0.082977
Critical Value of Studentized Range= 3.487
Minimum Significant Difference= 0.0917

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	OPTION
A	5.64907	120	ONE
B	3.92944	120	TWO
C	3.78828	120	THREE
D	2.66023	120	FIVE
E	1.01404	120	SIX

General Linear Models Procedure

Tukey's Studentized Range (HSD) Test for variable: WAITT''E

NOTE: This test controls the type I experimentwise error rate.

Alpha= 0.1 Confidence= 0.9 df= 580 MSE= 0.082977
Critical Value of Studentized Range= 3.248
Minimum Significant Difference= 0.0764

Comparisons significant at the 0.1 level are indicated by '***'.

DISP Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
LNQ - FCFS	0.03984	0.11623	0.19261	***
LNQ - AHEAD	0.06352	0.13991	0.21629	***
LNQ - SPT	0.45398	0.53037	0.60675	***
FCFS - LNQ	-0.19261	-0.11623	-0.03984	***
FCFS - AHEAD	-0.05271	0.02368	0.10007	
FCFS - SPT	0.33775	0.41414	0.49053	***
AHEAD - LNQ	-0.21629	-0.13991	-0.06352	***
AHEAD - FCFS	-0.10007	-0.02368	0.05271	
AHEAD - SPT	0.31407	0.39046	0.46685	***
SPT - LNQ	-0.60675	-0.53037	-0.45398	***
SPT - FCFS	-0.49053	-0.41414	-0.33775	***
SPT - AHEAD	-0.46685	-0.39046	-0.31407	***

General Linear Models Procedure

Tukey's Studentized Range (HSD) Test for variable: WAITTIME

NOTE: This test controls the type I experimentwise error rate, but generally has a higher type II error rate than REGWQ.

Alpha= 0.1 df= 580 MSE= 0.082977
Critical Value of Studentized Range= 3.248
Minimum Significant Difference= 0.0764

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	DISP
A	3.60484	150	LNQ
B	3.48861	150	FCFS
B			
B	3.46493	150	AHEAD
C	3.07447	150	SPT

Level of OPTION	Level of DISP	N	WAITTIME Mean	WAITTIME SD
FIVE	AHEAD	30	2.61050000	0.23958840
FIVE	FCFS	30	2.64383333	0.27274468
FIVE	LNQ	30	2.80206667	0.24099763
FIVE	SPT	30	2.58453333	0.29844017
ONE	AHEAD	30	5.96603333	0.52800663
ONE	FCFS	30	5.76170000	0.43863347
ONE	LNQ	30	6.22773333	0.55425047
ONE	SPT	30	4.64083333	0.24544135
SIX	AHEAD	30	1.00320000	0.18264218
SIX	FCFS	30	1.18106667	0.12515368
SIX	LNQ	30	0.96910000	0.15685450
SIX	SPT	30	0.90280000	0.13982462
THREE	AHEAD	30	3.80370000	0.20421509
THREE	FCFS	30	3.85496667	0.26792272
THREE	LNQ	30	3.93660000	0.22469559
THREE	SPT	30	3.55786667	0.20509035
TWO	AHEAD	30	3.94123333	0.21972329
TWO	FCFS	30	4.00150000	0.22938400
TWO	LNQ	30	4.08870000	0.26322354
TWO	SPT	30	3.68633333	0.26940603

Plot of RESIDW*PREDW. Legend: A = 1 obs, B = 2 obs, etc.

```
RESIDW |
       |
   1.5 +
       |                                                                A
       |
       |                                                              A A
       |
   1.0 +
       |                                                              A
       |                                                            A
       |                             A                              A A A
       |                                                              A A
       |                                                            A
       |                            AA                                B A
   0.5 +                           C         BB BAB                 B B
       |           A               B B        A C        A
       |            A              D         A BC B      A          C B
       |            D              BDC       ABAFCC      C              B
       |           BG D            BAB        BAGAB      B          B   B
       |           CF A            CDD       DBEIDA      C          A   D
       |           EG G            GAE       CDDKEC      E          B B B
   0.0 +           EI H            GCA       CFEKEC      B          C A
       |           FF F            IDC       FBDHBD      A            B D
       |           GI A            EBC       D   JBA     E          C   A
       |           AI B            ED        FDEFCB      C          B D A
       |            B A            CBE        BBDBD      B          B C A
       |                           BB            F B                B A B
       |                           DAA        B BA                  B B A
  -0.5 +                              A         AAAA     A          A B
       |                           A          A A                   A
       |                                                 A              A
       |                                                                A
       |                                                              B A
       |
       |                                                              A A
  -1.0 +                                                                A
       |
       |                                                            A
       |
       |
       |
       ---+---------+---------+---------+---------+---------+---------+---------+--
          0         1         2         3         4         5         6         7

                                          PREDW
```

General Linear Models Procedure
Class Level Information

Class	Levels	Values
OPTION	5	FIVE ONE SIX THREE TWO
DISP	4	AHEAD FCFS LNQ SPT

Number of observations in data set = 600

General Linear Models Procedure

Dependent Variable: THROUGHP

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	19	16699.0183	878.8957	30.45	0.0001
Error	580	16740.7667	28.8634		
Corrected Total	599	33439.7850			

R-Square	C.V.	Root MSE	THROUGHP Mean
0.499376	3.235548	5.37247	166.045

Source	DF	Type I SS	Mean Square	F Value	Pr > F
OPTION	4	16228.0767	4057.0192	140.56	0.0001
DISP	3	224.7650	74.9217	2.60	0.0517
OPTION*DISP	12	246.1767	20.5147	0.71	0.7417

Source	DF	Type III SS	Mean Square	F Value	Pr > F
OPTION	4	16228.0767	4057.0192	140.56	0.0001
DISF	3	224.7650	74.9217	2.60	0.0517
OPTION*DISP	12	246.1767	20.5147	0.71	0.7417

General Linear Models Procedure

Tukey's Studentized Range (HSD) Test for variable: THROUGHP

NOTE: This test controls the type I experimentwise error rate.

Alpha= 0.1 Confidence= 0.9 df= 580 MSE= 28.86339
Critical Value of Studentized Range= 3.487
Minimum Significant Difference= 1.7101

Comparisons significant at the 0.1 level are indicated by '***'.

OPTION Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
SIX - FIVE	1.7649	3.4750	5.1851	***
SIX - THREE	1.9983	3.7083	5.4184	***
SIX - TWO	2.4566	4.1667	5.8767	***
SIX - ONE	13.5899	15.3000	17.0101	***
FIVE - SIX	-5.1851	-3.4750	-1.7649	***
FIVE - THREE	-1.4767	0.2333	1.9434	
FIVE - TWO	-1.0184	0.6917	2.4017	
FIVE - ONE	10.1149	11.8250	13.5351	***
THREE - SIX	-5.4184	-3.7083	-1.9983	***
THREE - FIVE	-1.9434	-0.2333	1.4767	
THREE - TWO	-1.2517	0.4583	2.1684	
THREE - ONE	9.8816	11.5917	13.3017	***
TWO - SIX	-5.8767	-4.1667	-2.4566	***
TWO - FIVE	-2.4017	-0.6917	1.0184	
TWO - THREE	-2.1684	-0.4583	1.2517	
TWO - ONE	9.4233	11.1333	12.8434	***
ONE - SIX	-17.0101	-15.3000	-13.5899	***
ONE - FIVE	-13.5351	-11.8250	-10.1149	***
ONE - THREE	-13.3017	-11.5917	-9.8816	***
ONE - TWO	-12.8434	-11.1333	-9.4233	***

General Linear Models Procedure

Tukey's Studentized Range (HSD) Test for variable: THROUGHP

NOTE: This test controls the type I experimentwise error rate, but generally has a higher type II error rate than REGWQ.

Alpha= 0.1 df= 580 MSE= 28.86339
Critical Value of Studentized Range= 3.487
Minimum Significant Difference= 1.7101

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	OPTION
A	171.3750	120	SIX
B	167.9000	120	FIVE
B			
B	167.6667	120	THREE
B			
B	167.2083	120	TWO
C	156.0750	120	ONE

General Linear Models Procedure

Tukey's Studentized Range (HSD) Test for variable: THROUGHP

NOTE: This test controls the type I experimentwise error rate.

Alpha= 0.1 Confidence= 0.9 df= 580 MSE= 28.86339
Critical Value of Studentized Range= 3.248
Minimum Significant Difference= 1.4247

Comparisons significant at the 0.1 level are indicated by '***'.

DISP Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
SPT - AHEAD	-0.3513	1.0733	2.4980	
SPT - FCFS	0.0087	1.4333	2.8580	***
SPT - LNQ	0.1287	1.5533	2.9780	***
AHEAD - SPT	-2.4980	-1.0733	0.3513	
AHEAD - FCFS	-1.0647	0.3600	1.7847	
AHEAD - LNQ	-0.9447	0.4800	1.9047	
FCFS - SPT	-2.8580	-1.4333	-0.0087	***
FCFS - AHEAD	-1.7847	-0.3600	1.0647	
FCFS - LNQ	-1.3047	0.1200	1.5447	
LNQ - SPT	-2.9780	-1.5533	-0.1287	***
LNQ - AHEAD	-1.9047	-0.4800	0.9447	
LNQ - FCFS	-1.5447	-0.1200	1.3047	

General Linear Models Procedure

Tukey's Studentized Range (HSD) Test for variable: THROUGHP

NOTE: This test controls the type I experimentwise error rate, but generally has a higher type II error rate than REGWQ.

Alpha= 0.1 df= 580 MSE= 28.86339
Critical Value of Studentized Range= 3.248
Minimum Significant Difference= 1.4247

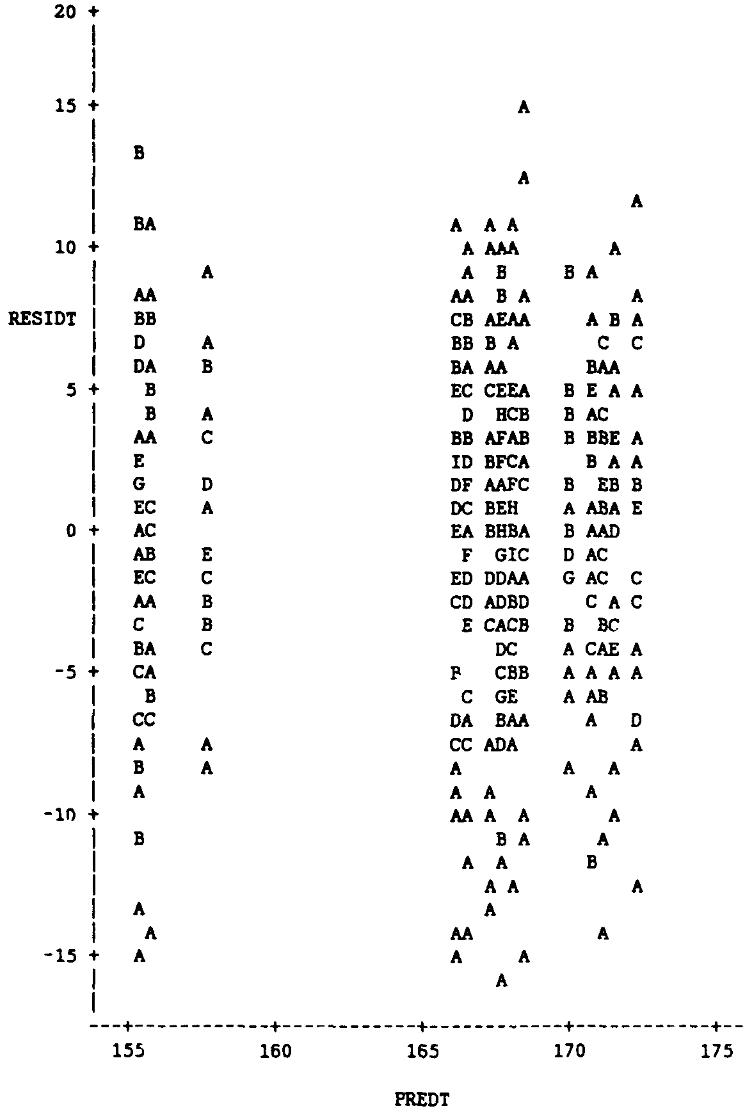
Means with the same letter are not significantly different.

Tukey Grouping		Mean	N	DISP
	A	167.0600	150	SPT
	A			
B	A	165.9867	150	AHEAD
B				
B		165.6267	150	FCFS
B				
B		165.5067	150	LNQ

Level of OPTION	Level of DISP	N	THROUGHP Mean	THROUGHP SD
FIVE	AHEAD	30	167.500000	5.38036020
FIVE	FCFS	30	167.766667	5.04246336
FIVE	LNQ	30	166.333333	6.05909595
FIVE	SPT	30	170.000000	3.99137000
ONE	AHEAD	30	155.566667	6.35003846
ONE	FCFS	30	155.366667	6.42453988
ONE	LNQ	30	155.866667	5.54438724
ONE	SPT	30	157.500000	4.12519592
SIX	AHEAD	30	170.766667	5.65492360
SIX	FCFS	30	171.033333	4.94440355
SIX	LNQ	30	172.333333	5.53567323
SIX	SPT	30	171.366667	4.85289344
THREE	AHEAD	30	168.000000	3.96536731
THREE	FCFS	30	167.400000	6.17894088
THREE	LNQ	30	166.666667	4.85892945
THREE	SPT	30	168.600000	6.37668166
TWO	AHEAD	30	168.100000	4.86613916
TWO	FCFS	30	166.566667	5.51288981
TWO	LNQ	30	166.333333	5.16842758
TWO	SPT	30	167.833333	5.59607827

Exponential Arrival Rate Data, Increase # of Paint AC 7

Plot of RESIDT*PREDT. Legend: A = 1 obs, B = 2 obs, etc.



General Linear Models Procedure
Class Level Information

Class	Levels	Values
OPTION	5	FIVE ONE SIX THREE TWO
DISP	4	AHEAD FCFS LNQ SPT

Number of observations in data set = 600

General Linear Models Procedure

Dependent Variable: WAITTIME

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	19	45762.9258	2408.5750	574.09	0.0001
Error	580	2433.3899	4.1955		
Corrected Total	599	48196.3156			

R-Square	C.V.	Root MSE	WAITTIME Mean
0.949511	16.85309	2.04829	12.1538

Source	DF	Type I SS	Mean Square	F Value	Pr > F
OPTION	4	43291.4982	10822.8745	2579.64	0.0001
DISP	3	1160.9198	386.9733	92.24	0.0001
OPTION*DISP	12	1310.5078	109.2090	26.03	0.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
OPTION	4	43291.4982	10822.8745	2579.64	0.0001
DISP	3	1160.9198	386.9733	92.24	0.0001
OPTION*DISP	12	1310.5078	109.2090	26.03	0.0001

General Linear Models Procedure

Tukey's Studentized Range (HSD) Test for variable: WAITTIME

NOTE: This test controls the type I experimentwise error rate.

Alpha= 0.1 Confidence= 0.9 df= 580 MSE= 4.1955
Critical Value of Studentized Range= 3.487
Minimum Significant Difference= 0.652

Comparisons significant at the 0.1 level are indicated by '***'.

OPTION Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
ONE - TWO	16.4242	17.0762	17.7282	***
ONE - THREE	17.1476	17.7995	18.4515	***
ONE - FIVE	18.5229	19.1749	19.8268	***
ONE - SIX	24.8520	25.5040	26.1560	***
TWO - ONE	-17.7282	-17.0762	-16.4242	***
TWO - THREE	0.0714	0.7233	1.3753	***
TWO - FIVE	1.4467	2.0987	2.7506	***
TWO - SIX	7.7758	8.4278	9.0798	***
THREE - ONE	-18.4515	-17.7995	-17.1476	***
THREE - TWO	-1.3753	-0.7233	-0.0714	***
THREE - FIVE	0.7234	1.3753	2.0273	***
THREE - SIX	7.0525	7.7045	8.3564	***
FIVE - ONE	-19.8268	-19.1749	-18.5229	***
FIVE - TWO	-2.7506	-2.0987	-1.4467	***
FIVE - THREE	-2.0273	-1.3753	-0.7234	***
FIVE - SIX	5.6771	6.3291	6.9811	***
SIX - ONE	-26.1560	-25.5040	-24.8520	***
SIX - TWO	-9.0798	-8.4278	-7.7758	***
SIX - THREE	-8.3564	-7.7045	-7.0525	***
SIX - FIVE	-6.9811	-6.3291	-5.6771	***

General Linear Models Procedure

Tukey's Studentized Range (HSD) Test for variable: WAITTIME

NOTE: This test controls the type I experimentwise error rate, but generally has a higher type II error rate than REGWQ.

Alpha= 0.1 df= 580 MSE= 4.1955
Critical Value of Studentized Range= 3.487
Minimum Significant Difference= 0.652

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	OPTION
A	28.0647	120	ONE
B	10.9885	120	TWO
C	10.2652	120	THREE
D	8.8899	120	FIVE
E	2.5607	120	SIX

General Linear Models Procedure

Tukey's Studentized Range (HSD) Test for variable: WAITTIME

NOTE: This test controls the type I experimentwise error rate.

Alpha= 0.1 Confidence= 0.9 df= 580 MSE= 4.1955
Critical Value of Studentized Range= 3.248
Minimum Significant Difference= 0.5432

Comparisons significant at the 0.1 level are indicated by '***'.

DISP Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
LNQ - FCFS	-0.3701	0.1730	0.7162	
LNQ - AHEAD	-0.0691	0.4740	1.0172	
LNQ - SPT	2.8609	3.4041	3.9472	***
FCFS - LNQ	-0.7162	-0.1730	0.3701	
FCFS - AHEAD	-0.2421	0.3010	0.8442	
FCFS - SPT	2.6879	3.2311	3.7742	***
AHEAD - LNQ	-1.0172	-0.4740	0.0691	
AHEAD - FCFS	-0.8442	-0.3010	0.2421	
AHEAD - SPT	2.3869	2.9300	3.4732	***
SPT - LNQ	-3.9472	-3.4041	-2.8609	***
SPT - FCFS	-3.7742	-3.2311	-2.6879	***
SPT - AHEAD	-3.4732	-2.9300	-2.3869	***

General Linear Models Procedure

Tukey's Studentized Range (HSD) Test for variable: WAITTIME

NOTE: This test controls the type I experimentwise error rate, but generally has a higher type II error rate than REGWQ.

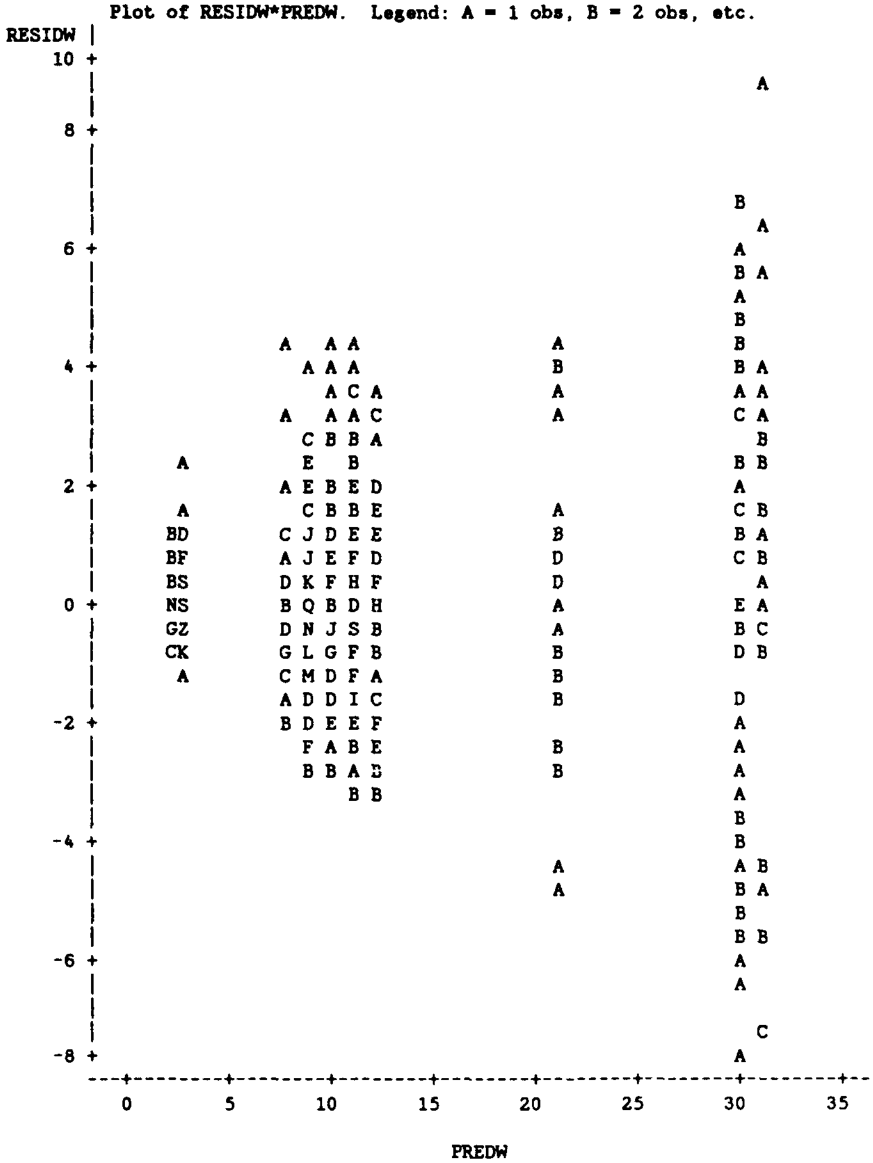
Alpha= 0.1 df= 580 MSE= 4.1955
Critical Value of Studentized Range= 3.248
Minimum Significant Difference= 0.5432

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	DISP
A	13.1666	150	LNQ
A			
A	12.9936	150	FCFS
A			
A	12.6926	150	AHEAD
B	9.7625	150	SPT

Level of OPTION	Level of DISP	N	-----------WAITTIME---------- Mean	SD
FIVE	AHEAD	30	8.8553667	1.67502260
FIVE	FCFS	30	9.0605667	1.37822794
FIVE	LNQ	30	9.9980000	1.68593752
FIVE	SPT	30	7.6455000	1.42996329
ONE	AHEAD	30	31.2391000	4.24483620
ONE	FCFS	30	30.2339000	3.60767784
ONE	LNQ	30	29.8772333	3.95929084
ONE	SPT	30	20.9086667	2.34760427
SIX	AHEAD	30	2.5674667	0.57189074
SIX	FCFS	30	2.6840333	0.72664218
SIX	LNQ	30	2.5026333	0.52836772
SIX	SPT	30	2.4888000	0.50247006
THREE	AHEAD	30	9.9642333	1.64940085
THREE	FCFS	30	10.9948000	1.89158728
THREE	LNQ	30	11.3324333	1.57985396
THREE	SPT	30	8.7693000	1.28739917
TWO	AHEAD	30	10.8366000	1.57640131
TWO	FCFS	30	11 9945333	2.05327052
TWO	LNQ	30	12.1226667	1.56265226
TWO	SPT	30	9.0003000	1.05587787

Exponential Arrival Rate Data, Increase # of Paint AC 14
Plot of RESIDW*PREDW. Legend: A = 1 obs, B = 2 obs, etc.



Appendix E. SLAM II Code

Appendix E provides the SLAM II coding for this research. The first coding presented is the SLAM II coding for Option 1 under the FCFS dispatching rule. To alter the dispatching rule for the experimental design, INTLC values are modified as defined in the code.

To model each configuration option, changes are made by altering the logic in the following sections of the code: C-130 Wash, DePaint, W/E/A, and Paint. These modifications are also provided in this Appendix.

To model aircraft preemption, changes to the following sections of the code: Depaint, W/E/A. These modifications are provided within this Appendix.

A table of contents for this appendix is provided below:

SLAM II Code For Option 1, FCFS Dispatching

```
GEN,McELVEEN,THESIS OPTION 1 FCFS,1/10/1992,30,N,N,,,N,72;
LIMITS,45,30,1000;
INIT,0,1500;
EQUIVALENCE/ATRIB(1),MT/ATRIB(2),WARM/ATRIB(3),WORK/ATRIB(4),TAIL;
EQUIVALENCE/ATRIB(5),TYPE/ATRIB(7),HNG_CHS/ATRIB(9),HNG_FLG;
EQUIVALENCE/ATRIB(10),DPT_HGR/ATRIB(11),WEA_HGR/ATRIB(12),PNT_HGR;
EQUIVALENCE/ATRIB(13),WASH_HGR/ATRIB(14),X_WASH/ATRIB(15),NEED;
EQUIVALENCE/ATRIB(16),ARV_TIME/ATRIB(17),PDM_PNT;
EQUIVALENCE/ATRIB(22),WASH_WT/ATRIB(23),DP_WT/ATRIB(24),WEA_WT
EQUIVALENCE/ATRIB(25),PNT_WT/ATRIB(26),SUM_WT/ATRIB(27),MK_WT;
EQUIVALENCE/XX(10),D_50/XX(11),D_54/XX(12),D_89;
EQUIVALENCE/XX(13),D_WASH/XX(14),D_DP/XX(15),D_WEA/XX(16),D_PNT;
;
;=================================================================
;
;   INTLC USED TO SET DISPATCHING RULES
;
;  The Following Code Represents the respective dispatching rules:
;  (For Bldgs 50, 54, 89)
;
;     10, 11, 12:        FCFS
;     13, 14, 15:        SPT (options 1, 2, 3, and 5)
;     16, 17, 18:        SPT (Option 6)
;     19, 20, 21:        LNQ
;     41, 46, 51:        AHEAD (Option 1)
;     42, 47, 52:        AHEAD (Option 2)
;     43, 48, 53:        AHEAD (Option 3)
;     44, 49, 54:        AHEAD (Option 5)
;     45, 50, 55:        AHEAD (Option 6)
;
;   The Following Code Represents the respective Facility Dispatching
;     rules (For Wash, Depaint, W/E/A, and Paint)
;
;     26, 27, 28, 29:   FF
;     22, 23, 24, 25:  MINU
;
;=================================================================
INTLC,XX(10)=10,XX(11)=11,XX(12)=12;
INTLC,D_WASH=26,D_DP=27,D_WEA=28,D_PNT=29;
;
;-----------------------------------------------------------------
;  THIS IS OPTION 1 (INDEPENDENT FACILITIES, CURRENT CAPABILITIES)
;                     FCFS
;    EXPONENTIAL ARRIVAL PROCESS
;    BLDG 50 - WASH, DEPAINT, W/E/A, PAINT - C-130 AC
;    BLDG 54 - DEPAINT, W/E/A    -  C-141 AC
;    BLDG 89 - PAINT             -  C-141 AC
```

```
;
NETWORK;
      RESOURCE/1,IN_C141(35),1;      LIMITS # C-141S IN SYSTEM
      RESOURCE/2,IN_C130(9),2;            LIMITS # C-130S IN SYSTEM
      RESOURCE/3,BLDG_54,11;          BUILDING 54
      RESOURCE/4,BLDG_89,12;          BUILDING 89
      RESOURCE/5,BLDG_50,10;          BUILDING 50
      RESOURCE/7,SNGL_HNG(6),20;      SINGLE BAY HANGARS;
      RESOURCE/8,DBL_HNG(0),21;       HANGAR IN WHICH A/C MOVED IN PAIRS;
      RESOURCE/9,DMPREP(1),31;             DeMATE PREP
      RESOURCE/10,M_DEM(1),32,33;     MATE DEMATE FACILITY
      RESOURCE/11,Pre_WS(1),34;            PRE WING SHOP
      RESOURCE/12,WING(1),35;         WING SHOP
      RESOURCE/13,POST_WS(1),36;      POST WING SHOP
      RESOURCE/14,CIGAR(1),37;             CIGAR SHOP
      RESOURCE/15,FUNCTEST(4),17;     FUNCTIONAL TEST
      RESOURCE/16,SL_SLOT(20),40;        LIMITS SPEEDLINE AC INTO SYSTEM
      RESOURCE/17,CW_SLOT(2),41;         LIMITS CW AC IN SYSTEM
      RESOURCE/18,PDM_SLOT(8),42;           LIMITS PDM SLOTS IN SYSTEM
      RESOURCE/19,PDM_ACT(6),29;              LIMITS # OF PDM AC IN WORK
      RESOURCE/20,C130_PDM(7),43;   C-130 PDM

;
      CREATE,,104,,1;             SL + PDM HANGAR ON 15 JAN 92
      ALTER,DBL_HNG/+3;
      TERM;
;
      CREATE,,265,,1;          CONVERSION OF HANGARS, 1 JUL 92
      ALTER,SNGL_HNG/+2;
      ALTER,DBL_HNG/-2;
      TERM;
;
      CREATE,,384,,1;          ADDITIONAL 4 SL + PDM HANGARS, 1 NOV 92
      ALTER,DBL_HNG/+4;
      TERM;
;
      CREATE,,443,,1;          ADDITIONAL 2 SL + PDM HANGARS, 1 JAN 93
      ALTER,DBL_HNG/+2;
      TERM;
;
      CREATE,,514,,1;
      ALTER,SL_SLOT/+5;
      TERM;
;
      CREATE,,531,,1;          ADDITIONAL 4 SL + PDM HANGARS, 1 APR 93
      ALTER,DBL_HNG/+4;
      TERM;
;
;      CREATE,,709,,1;
;      ALTER,SL_SLOT/-25;
```

```
;       TERM;
;
;*************************************************
;WARM UP SYSTEM BY INPUTTING AC INTO SYSTEM
;*************************************************

        CREATE,,0,1,1,1;        GENERATING 1/3 WARM-UP C-130 AC
        ASSIGN,XX(1)=XX(1)+1,TYPE=130,WORK=10,WARM=1,TAIL=XX(1),1;
        ACTIVITY;
        AWAIT(2),IN_C130,,1;
        ACTIVITY;
        EVENT,31,1;
        TERM;
;
        CREATE,,0,1,1,1;        GENERATING 2/3 WARM-UP C-130 AC
        ASSIGN,XX(1)=XX(1)+1,TYPE=130,WORK=10,WARM=1,TAIL=XX(1),1;
        ACTIVITY;
        AWAIT(2),IN_C130,,1;
        ACTIVITY;
        EVENT,31,1;
        TERM;

        CREATE,,0,1,1,1;        GENERATING 3/3 WARM-UP C-130 AC
        ASSIGN,XX(1)=XX(1)+1,TYPE=130,WORK=11,WARM=1,TAIL=XX(1),1;
        ACTIVITY;
        AWAIT(2),IN_C130,,1;
        ACTIVITY,.1;
        EVENT,32,1;
        TERM;
;
        CREATE,,0,1,1,1;        GENERATE 1/3 TYPE-1 WARM-UP AC
        ASSIGN,XX(1)=XX(1)+1,TYPE=141,WORK=1,WARM=1,TAIL=XX(1),1;
        ACTIVITY;
        AWAIT(40),SL_SLOT,,1;
        AWAIT(1),IN_C141,,1;
        ACTIVITY;
        EVENT,33,1;
        TERM;
;
        CREATE,,0,1,1,1;        GENERATE 2/3 TYPE-1 WARM-UP AC
        ASSIGN,XX(1)=XX(1)+1,TYPE=141,WORK=1,WARM=1,TAIL=XX(1),1;
        ACTIVITY;
        AWAIT(40),SL_SLOT,,1;
        AWAIT(1),IN_C141,,1;
        ACTIVITY;
        EVENT,34,1;
        TERM;
;
        CREATE,,0,1,1,1;        GENERATE 3/3 TYPE-1 WARM-UP AC
        ASSIGN,XX(1)=XX(1)+1,TYPE=141,WORK=1,WARM=1,TAIL=XX(1),1;
```

```
ACTIVITY;
AWAIT(40),SL_SLOT,,1;
AWAIT(1),IN_C141,,1;
ACTIVITY;
EVENT,35,1;
TERM;
;
CREATE,,0,1,1,1;       GENERATE 1/1 TYPE-2 WARM-UP AC
ASSIGN,XX(1)=XX(1)+1,TYPE=141,WORK=2,WARM=1,TAIL=XX(1),1;
ACTIVITY;
AWAIT(40),SL_SLOT,,1;
AWAIT(1),IN_C141,,1;
ACTIVITY;
EVENT,36,1;
TERM;
;
CREATE,,0,1,1,1;       GENERATE 1/2 TYPE-3 WARM-UP AC
ASSIGN,XX(1)=XX(1)+1,TYPE=141,WORK=3,WARM=1,TAIL=XX(1),1;
ACTIVITY;
AWAIT(40),SL_SLOT,,1;
AWAIT(1),IN_C141,,1;
ACTIVITY;
EVENT,37,1;
TERM;
;
CREATE,,0,1,1,1;       GENERATE 2/2 TYPE-3 WARM-UP AC
ASSIGN,XX(1)=XX(1)+1,TYPE=141,WORK=3,WARM=1,TAIL=XX(1),1;
ACTIVITY;
AWAIT(40),SL_SLOT,,1;
AWAIT(1),IN_C141,,1;
ACTIVITY;
EVENT,38,1;
TERM;
;
CREATE,,0,1,1,1;;       GENERATE 1/1 TYPE-4 WARM-UP AC
ASSIGN,XX(1)=XX(1)+1,TYPE=141,WORK=4,WARM=1,TAIL=XX(1),1;
ACTIVITY;
AWAIT(41),CW_SLOT,,1;
AWAIT(1),IN_C141,,1;
ACTIVITY;
EVENT,39,1;
TERM;
;
CREATE,,0,1,1,1;;       GENERATE 1/1 TYPE-6 WARM-UP AC
ASSIGN,XX(1)=XX(1)+1,TYPE=141,WORK=6,WARM=1,TAIL=XX(1),1;
ACTIVITY;
AWAIT(40),SL_SLOT,,1;
AWAIT(1),IN_C141,,1;
ACTIVITY;
EVENT,40,1;
```

```
      TERM;
;
;**************************************************
;GENERATION OF 5 TYPES OF PLANES WITH A USER FUNCTION
;
;**************************************************
;
     CREATE,EXPON(21,2),,1,30,1;    GENERATING C-130 TYPE-10 AC @ 15/yr
     ASSIGN,TYPE=130,WARM=0,WORK=10,1;
     ACTIVITY,,,DP30;
;
     CREATE,EXPON(46,2),,1,14,1;    GENERATING C-130 TYPE-11 AC @ 7/yr
     ASSIGN,TYPE=130,WARM=0,WORK=11,1;
     ACTIVITY,,,WS30;
;
     CREATE,EXPON(7.5,2),,1,81,1;    GENERATE C-141 TYPE-1, SL ONLY
     ASSIGN,XX(1)=XX(1)+1,TYPE=141,WORK=1,WARM=0,TAIL=XX(1),1;
     ACTIVITY,,,CHSE;
;
     CREATE,EXPON(17.7,2),,1,33,1;   GENERATE C-141 TYPE-2, SL PAINT
     ASSIGN,XX(1)=XX(1)+1,TYPE=141,WORK=2,WARM=0,TAIL=XX(1),1;
     ACTIVITY,,,CHSE;
;
     CREATE,EXPON(10.1,2),,1,46,1;  GENERATE C-141 TYPE-3, SL PDM PAINT
     ASSIGN,XX(1)=XX(1)+1,TYPE=141,WORK=3,WARM=0,TAIL=XX(1),1;
     ACTIVITY,,,CHSE;
;
     CREATE,EXPON(50.3,2),,1,8,1;       GENERATE C-141 TYPE-4, CW BOX
     ASSIGN,XX(1)=XX(1)+1,TYPE=141,WORK=4,WARM=0,TAIL=XX(1),1;
     ACTIVITY,,,CHSE;
;
     CREATE,EXPON(20,2),,1,23,1;       GENERATE C-141 TYPE-6, SL PDM
     ASSIGN,XX(1)=XX(1)+1,TYPE=141,WORK=6,WARM=0,TAIL=XX(1),1;
     ACTIVITY,,,CHSE;
;
;
;**************************************************
; ALL AIRCRAFT IN SYSTEM, MAINTAIN PRESSURE ON SYSTEM
;**************************************************

     CREATE,EXPON(21,2),710,1,30,1; GENERATING C-130 TYPE-10 AC @ 15/yr
     ASSIGN,TYPE=130,WARM=1,WORK=10,1;
     ACTIVITY,,,DP30;
;
     CREATE,EXPON(46,2),710,1,14,1; GENERATING C-130 TYPE-11 AC @ 7/yr
     ASSIGN,TYPE=130,WARM=1,WORK=11,1;
     ACTIVITY,,,WS30;
;
     CREATE,EXPON(7.5,2),710,1,81,1;   GENERATE C-141 TYPE-1, SL ONLY
     ASSIGN,XX(1)=XX(1)+1,TYPE=141,WORK=1,WARM=1,TAIL=XX(1),1;
```

```
      ACTIVITY,,,CHSE;
;
      CREATE,EXPON(17.7,2),710,1,33,1;  GENERATE C-141 TYPE-2, SL PAINT
      ASSIGN,XX(1)=XX(1)+1,TYPE=141,WORK=2,WARM=1,TAIL=XX(1),1;
      ACTIVITY,,,CHSE;
;
      CREATE,EXPON(10.1,2),710,1,46,1;GENERATE C-141 TYPE-3, SLPDM PAINT
      ASSIGN,XX(1)=XX(1)+1,TYPE=141,WORK=3,WARM=1,TAIL=XX(1),1;
      ACTIVITY,,,CHSE;
;
      CREATE,EXPON(50.3,2),710,1,8,1;    GENERATE C-141 TYPE-4, CW BOX
      ASSIGN,XX(1)=XX(1)+1,TYPE=141,WORK=4,WARM=1,TAIL=XX(1),1;
      ACTIVITY,,,CHSE;
;
      CREATE,EXPON(20,2),710,1,23,1;    GENERATE C-141 TYPE-6, SL PDM
      ASSIGN,XX(1)=XX(1)+1,TYPE=141,WORK=6,WARM=1,TAIL=XX(1),1;
      ACTIVITY,,,CHSE;
;*******************************************************
;     DETERMINE WHERE AC SHOULD GO BASED AN ATRIB(WORK)
;*******************************************************
;
CHSE  GOON,1;
      ACTIVITY,,WORK.EQ.1.OR.WORK.EQ.2.OR.WORK.EQ.3.OR.WORK.EQ.6,SLSLT;
      ACTIVITY,,WORK.EQ.4,CWSLT;
      ACTIVITY,,WORK.EQ.5.OR.WORK.EQ.7,PMSLT;

SLSLT AWAIT(40),SL_SLOT,,1;
      AWAIT(1),IN_C141,,1;
      ACTIVITY,,,SLT2;

SLT2  ASSIGN,MT=TNOW,1;
      ACTIVITY,,WORK.EQ.2.OR.WORK.EQ.3,PREP;
      ACTIVITY,,WORK.EQ.1.OR.WORK.EQ.6,SPLN;

CWSLT AWAIT(41),CW_SLOT,,1;
      AWAIT(1),IN_C141,,1;
      ACTIVITY;
      ASSIGN,MT=TNOW,1;
      ACTIVITY,,,PREP;

PMSLT AWAIT(42),PDM_SLOT,,1;
      AWAIT(1),IN_C141,,1;
      ACTIVITY;
      ASSIGN,MT=TNOW,1;
      ACTIVITY,,WORK.EQ.7,PREP;
      ACTIVITY,,WORK.EQ.5,PDM;

DP30  AWAIT(2),IN_C130,,1;
      ACTIVITY;
      ASSIGN,WORK=10,MT=TNOW,1;
```

```
      ACTIVITY,,,PREP;

WS30  AWAIT(2),IN_C130,,1;
      ACTIVITY;
      ASSIGN,WORK=11,MT=TNOW,1;
      ACTIVITY,,,WASH;
;
;------------------------------------------------------------
;     C-130 WASH (INCOMMING & OUTGOING) BLDG 50
;------------------------------------------------------------
;
      ENTER,32,1;
      ACTIVITY;
WASH  ASSIGN,NEED=2,ARV_TIME=TNOW,MK_WT=TNOW,1;
      ACTIVITY,,NNRSC(3).EQ.1,WSE4;  IF 54 BUSY
      ACTIVITY,,,WSEV;                     FILE ENTITY FILE 3

WSEV  EVENT,6,1;                                        FILEM(3,ATRIB)
      TERM;

      ENTER,5,1;
      ACTIVITY;
WSE4  AWAIT(11),BLDG_54,1;
      ACTIVITY;
      ASSIGN,WASH_HGR=54,WASH_WT=TNOW-MK_WT,SUM_WT=SUM_WT+WASH_WT,1;
      ACTIVITY,,,WASA;

WASA  GOON,1;
      ACTIVITY,TRIAG(.5,.65,.8,1);
      ASSIGN,X_WASH=X_WASH+1,1;
      ACTIVITY,TRIAG(.5,.65,.8,1),X_WASH.GE.2,WAAS;  SCUFF SAND C-130
      ACTIVITY,,,WAAS;

WAAS  GOON,1;
      ACTIVITY,,WASH_HGR.EQ.54,WF54;

WF54  FREE,BLDG_54,2;
      ACTIVITY,,,WSGO;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,NNQ(11).GT.0,TERM;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,NNQ(3).EQ.0.AND.NNQ(4).EQ.0.AND.NNQ(5).EQ.0,TERM;
      ACTIVITY;
WFREE GOON,1;
      ACTIVITY,,D_54.EQ.11,WC54;
      ACTIVITY,,D_54.EQ.14,WS54;
      ACTIVITY,,D_54.EQ.20,WL54;
      ACTIVITY,,D_54.EQ.46,WA54;
```

```
WC54  EVENT,11,1;             LOOK TO SEE IF BLDG 54 NEEDED (LOOK 54)
      TERM;

WS54  EVENT,14,1;             LOOK TO SEE IF BLDG 54 NEEDED (SPT 54)
      TERM;

WL54  EVENT,20,1;             LOOK TO SEE IF BLDG 54 NEEDED (LNQ 54)
      TERM;

WA54  EVENT,46,1;             LOOK TO SEE IF BLDG 54 NEEDED (AHEAD 54)
      TERM;

WSGO  GOON,1;
      ACTIVITY,,X_WASH.EQ.1,PD30;
      ACTIVITY,,X_WASH.EQ.2;
      GOON,1;
      ACTIVITY,TRIAG(1.6,2,2.6,1),,PAINT; INCLUDES C-130 PREP FOR PAINT
 ;
 ;====================================================
 ;         PREP FOR DePAINT
 ;====================================================
PREP  GOON,1;;
      ACTIVITY/1,TRIAG(4.56,5.70,7.41,1),,DEPT;DePaint
 ;
 ;====================================================
 ;         DePAINT  (50 OR 54)
 ;====================================================
 ;
      ENTER,36,1;
      ACTIVITY;
DEPT  ASSIGN,NEED=2,ARV_TIME=TNOW,MK_WT=TNOW,1;
      ACTIVITY,,NNRSC(3).EQ.1,DPA7;
      ACTIVITY,,,DEPE;

DEPE  EVENT,7,1;                         CALL FILEM(4,ATRIB)
      TERM;

      ENTER,8
      ACTIVITY;
DPA7  AWAIT(11),BLDG_54,1;
      ACTIVITY;
      ASSIGN,DPT_HGR=54,DP_WT=TNOW-MK_WT,SUM_WT=SUM_WT+DP_WT,1;
      ACTIVITY,,,DPTA;

DPTA  GOON,1;
      ACTIVITY,,DPT_HGR.EQ.54,DP54;

DP54  GOON,1;
      ACTIVITY,TRIAG(3,4,5,1),,FRDP;
```

```
FRDP  GOON,1;
      ACTIVITY,,DPT_HGR.EQ.54,DF54;

DF54  FREE,BLDG_54,2;
      ACTIVITY,,,DPGO;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,NNQ(11).GT.0,TERM;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,NNQ(3).EQ.0.AND.NNQ(4).EQ.0.AND.NNQ(5).EQ.0,TERM;
      ACTIVITY;
DFREE GOON,1
      ACTIVITY,,D_54.EQ.11,DC54;
      ACTIVITY,,D_54.EQ.14,DS54;
      ACTIVITY,,D_54.EQ.20,DL54;
      ACTIVITY,,D_54.EQ.46,DA54;


DC54  EVENT,11,1;                LOOK TO SEE IF BLDG 54 NEEDED (LOOK 54)
      TERM;

DS54  EVENT,14,1;                LOOK TO SEE IF BLDG 54 NEEDED (SPT 54)
      TERM;

DL54  EVENT,20,1;                LOOK TO SEE IF BLDG 54 NEEDED (LNQ 54)
      TERM;

DA54  EVENT,46,1;                LOOK TO SEE IF BLDG 54 NEEDED (AHEAD 54)
      TERM;

DPGO  GOON,1
      ACTIVITY,,TYPE.EQ.130,PD30;
      ACTIVITY,,TYPE.EQ.141,DPG1;
;
DPG1  GOON,1;
      ACTIVITY,,WORK.EQ.4,CWBX;
      ACTIVITY,,WORK.EQ.7,PDM;
      ACTIVITY,,WORK.EQ.2.OR.WORK.EQ.3,SPLN;
;
;==================================================
;          SPEED LINE
;==================================================
       ENTER,33,1;
       ACTIVITY;
SPLN   ASSIGN,ATRIB(20)=TNOW,1;
       ACTIVITY/2,,,SLPR;SL

;*** SPEEDLINE PREP ***
```

```
SLPR    GOON,1;
        ACTIVITY,TRIAG(3.2,4.0,5.2,1),WORK.EQ.1,HNGR;
        ACTIVITY,TRIAG(1.76,2.2,2.86,1),WORK.EQ.2,HNGR;
        ACTIVITY,TRIAG(6.88,8.60,11.18,1),WORK.EQ.3,HNGR;
        ACTIVITY,TRIAG(9.76,12.2,16.86,1),WORK.EQ.6,HNGR;
;
;*** RECEIVE HANGAR ASSIGNMENTS ***;
;
        ENTER,40,1;
        ACTIVITY;
HNGR    GOON,1;                     HANGAR SELECTION;
        ACTIVITY,,WORK.EQ.3.OR.WORK.EQ.6,DHNG;      - BASED ON SHORTEST;
        ACTIVITY,,,SHNG;     WAITING LINE;

DHNG    GOON,1;
        ACTIVITY/3,,NNQ(21).GE.3.AND.TNOW.LE.300,SHNG;9 TO S
        ACTIVITY/4,,NNQ(21).GE.4,SHNG;9 TO S
        ACTIVITY/5;TO DBL HGR
        AWAIT(21),DBL_HNG/1,1;          WAITING FOR DOUBLE BAY HANGAR;
        ASSIGN,ATRIB(9)=1,ATRIB(21)=TNOW,1;HANGAR TYPE FLAG - 1=DOUBLE;
        ACTIVITY,,,SPLW;

SHNG    AWAIT(20),SNGL_HNG/1,1;         WAITING FOR SINGLE BAY HANGAR;
        ASSIGN,ATRIB(9)=0,ATRIB(21)=TNOW,1;  HANGAR TYPE FLAG - 0=SINGLE;
        ACTIVITY,,,SPLW;

;***  ACTUAL SPEEDLINE WORK ***

SPLW    GOON,2;
        ACTIVITY,,,SPL3;
        ACTIVITY,,,SPL3;

SPL3    GOON,1;
        ACTIVITY,TRIAG(21.472,26.84,34.892,1),0.88,FACT;NOT NEED NEW BEAM
CAP;
        ACTIVITY,TRIAG(34.192,42.74,55.562,1),,FACT; NEEDS NEW BEAM CAP;

FACT    BATCH,30/4,2,,,,1;
        ACTIVITY,TRIAG(3.92,4.9,6.37,1),WORK.EQ.1,SLIN;
        ACTIVITY,TRIAG(0.48,0.6,0.78,1),WORK.EQ.2,SLIN;
        ACTIVITY,TRIAG(0.72,0.9,1.17,1),WORK.EQ.3.OR.WORK.EQ.6,SLIN;

SLIN    GOON,1;
        ACTIVITY,TRIAG(24,30,39,1),ATRIB(9).EQ.1,SLN2;
        ACTIVITY,,,SLN2;

SLN2    GOON,1;
        ACTIVITY,,TNOW.LT.178.AND.TAIL.GT.9,FRHNG;   CHORDWISE INSPECTION
        ACTIVITY,TRIAG(8,10,13,1),TNOW.GE.178.OR.TAIL.LE.9,FRHNG;
```

```
;*** FREE HANGARS ***

FRHNG  GOON,1;                          SORT BY HANGAR TYPE;
       ACTIVITY,,ATRIB(9).EQ.1,FDBL;
       ACTIVITY,,,FSNG;

FDBL   FREE,DBL_HNG;                          FREE DOUBLE HANGAR;
       ACTIVITY,,,RTE;

FSNG   FREE,SNGL_HNG;                         FREE SINGLE HANGAR;
       ACTIVITY,,,RTE;

RTE    FREE,SL_SLOT,1;              SEND TO APPROPRIATE FOLLOW-ON;
       ACTIVITY,,,SLGO                        PROCEDURES;

SLGO   GOON,1;
       ACTIVITY,,WORK.EQ.1.OR.WORK.EQ.2,BUILD;    TO SL BUILD UP;
       ACTIVITY,,WORK.EQ.3.OR.WORK.EQ.6,PDM; TO PDM;


;=====================================================
;               PDM
;=====================================================
;
      ENTER,37,1;
      ACTIVITY;
PDM   AWAIT(29),PDM_ACT,1;
      ACTIVITY,TRIAG(54,60,78,1),ATRIB(9).EQ.0,PDM2;PDM-0
      ACTIVITY,TRIAG(24,30,39,1),ATRIB(9).EQ.1,PDM2;PDM-1

PDM2  FREE,PDM_ACT,1;
      ACTIVITY,,WORK.EQ.3.OR.WORK.EQ.6,BUILD;
      ACTIVITY;
      FREE,PDM_SLOT,1;
      ACTIVITY,,,BUILD;

;==============================================================
;==============================================================
;          CW BOX MODULE
;==============================================================
;==============================================================

;******************************
;    PREP FOR DEMATE          *
;******************************
;
      ENTER,39,1;
      ACTIVITY;
CWBX  AWAIT(31),DMPREP,,1;
      ACTIVITY,TRIAG(6.8,8.5,11.05,1);
```

```
      FREE,DMPREP,1;
      ACTIVITY,,,DMATE;
;
;******************************
;       WING REMOVAL    *
;******************************
;
DMATE AWAIT(32),M_DEM,,1;
      ACTIVITY,TRIAG(3.2,4,5.2,1);
      FREE,M_DEM,2;
      ACTIVITY,,,WING;
      ACTIVITY,TRIAG(1.6,2,2.6,1),,CIGR;       Prep Fuselage
;
;******************************
;       WING SHOP       *
;******************************
;
;    Pre Wing Shop
;
WING  AWAIT(34),Pre_WS,,1;
      ACTIVITY,TRIAG(1.6,2,2.6,1);
      FREE,Pre_WS,1;
      ACTIVITY,,,WSaC;
;
;     Actual Wing Work
;
WSaC  AWAIT(35),WING,,1;
      ACTIVITY,TRIAG(40,50,65,1);
      FREE,WING,1;
      ACTIVITY,,,WJOI;

;*** Post Wing Shop ***
;
WJOI  AWAIT(36),POST_WS,,1;
      ACTIVITY,TRIAG(5.4,6,7.8,1);
      FREE,POST_WS,1;
      ACTIVITY,,,MATE;
;
;******************************
;       CIGAR SHOP      *
;******************************
;
CIGR  AWAIT(37),CIGAR,,1;
      ACTIVITY,TRIAG(72,90,117,1);
      FREE,CIGAR,1;
      ACTIVITY,,,MATE;
;
;*******************************
;     Mate Facility  *
;*******************************
```

```
;
MATE  BATCH,100/4,2,,,,1;
      ACTIVITY;
      AWAIT(33),M_DEM,,1;
      ACTIVITY,TRIAG(16.8,21,27.3,1);
      FREE,M_DEM,1;
      ACTIVITY;
      FREE,CW_SLOT,1;
      ACTIVITY,,,BUILD;

;==========================
;     C-130 PDM
;==========================
      ENTER,30,1;
      ACTIVITY;
PD30  AWAIT(43),C130_PDM,,1;
      ACTIVITY,TRIAG(70,80,90,3);
      FREE,C130_PDM,1;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,WORK.EQ.10,WEA;
      ACTIVITY,,WORK.EQ.11,WASH;

;==================================================
;          PREP FOR PAINT
;==================================================

PPNT  GOON,1;
      ACTIVITY,TRIAG(1.76,2.2,2.86,1),,WEA;      PREP FOR PAINT
;
;==================================================
;          W/E/A
;==================================================
;
      ENTER,35,1;
      ACTIVITY;
WEA   ASSIGN,NEED=2,ARV_TIME=TNOW,MK_WT=TNOW,1;
      ACTIVITY,,NNRSC(3).EQ.1.AND.NNQ(11).EQ.0,WE11;  IF 50 BUSY
      ACTIVITY,,,WEEV;                               FILE ENTITY (5)

WEEV  EVENT,8,1;                        CALL FILEM(5,ATRIB)
      TERM;

      ENTER,11,1;
      ACTIVITY;
WE11  AWAIT(11),BLDG_54,1;
      ACTIVITY;
      ASSIGN,WEA_HGR=54,WEA_WT=TNOW-MK_WT,SUM_WT=SUM_WT+WEA_WT,1;
      ACTIVITY,,,WEAA;
```

```
WEAA  GOON,1;
      ACTIVITY/8,TRIAG(.8,1,1.3,1);WEA
      GOON,1;
      ACTIVITY,,WEA_HGR.EQ.54,WEF54;

WEF54 FREE,BLDG_54,2;
      ACTIVITY,,,WEFE;
      ACTIVITY,,,WEFF;

WEFE  ASSIGN,NEED=3,MK_WT=TNOW,1;        NEED FOR PAINT
      ACTIVITY,,,PE15;

WEFF  GOON,1;
      ACTIVITY,,NNQ(11).GT.0,TERM;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,NNQ(3).EQ.0.AND.NNQ(4).EQ.0.AND.NNQ(5).EQ.0,TERM;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,D_54.EQ.11,EC54;
      ACTIVITY,,D_54.EQ.14,ES54;
      ACTIVITY,,D_54.EQ.20,EL54;
      ACTIVITY,,D_54.EQ.46,EA54;

EC54  EVENT,11,1;            LOOK TO SEE IF BLDG 54 NEEDED (LOOK 54)
      TERM;

ES54  EVENT,14,1;            LOOK TO SEE IF BLDG 54 NEEDED (SPT 54)
      TERM;

EL54  EVENT,20,1;            LOOK TO SEE IF BLDG 54 NEEDED (LNQ 54)
      TERM;

EA54  EVENT,46,1;            LOOK TO SEE IF BLDG 54 NEEDED (AHEAD 54)
      TERM;

;=======================================================
;          PAINT  (50 OR 89)
;=======================================================
;

PAINT ASSIGN,NEED=3,ARV_TIME=TNOW,MK_WT=TNOW,1;
      ACTIVITY,,NNRSC(4).EQ.1.AND.NNQ(12).EQ.0,PE15;   89 BUSY
      ACTIVITY,,,PAEN;                                FILE ENTITY (6)

PAEN  EVENT,9,1;                       CALL FILEM(6,ATRIB)
      TERM;

      ENTER,15,1;
      ACTIVITY;
```

```
PE15  AWAIT(12),BLDG_89,1;
      ACTIVITY;
      ASSIGN,PNT_HGR=89,PNT_WT=TNOW-MK_WT,SUM_WT=SUM_WT+PNT_WT,1;
      ACTIVITY,,,PNTA;

PNTA  GOON,1;
      ACTIVITY/9,TRIAG(3.2,4,5.2,1),TYPE.EQ.141,PTST;PAINT
      ACTIVITY,TRIAG(2.4,3,3.9,1),TYPE.EQ.130.AND.WORK.EQ.10,PTST;
      ACTIVITY,TRIAG(1.2,1.5,1.95,1),TYPE.EQ.130.AND.WORK.EQ.11,PTST;

PTST  GOON,1;
      ACTIVITY,,PNT_HGR.EQ.89,PF89;

PF89  FREE,BLDG_89,2;
      ACTIVITY,,,OUT;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,NNQ(12).GT.0,TERM;
      ACTIVITY;
PFREE GOON,1;
      ACTIVITY,,D_89.EQ.12,PC89;
      ACTIVITY,,D_89.EQ.15,PS89;
      ACTIVITY,,D_89.EQ.21,PL89;
      ACTIVITY,,D_89.EQ.51,PA89;

PC89  EVENT,12,1;             LOOK TO SEE IF BLDG 89 NEEDED (LOOK 89)
      TERM;

PS89  EVENT,15,1;             LOOK TO SEE IF BLDG 89 NEEDED (SPT 89)
      TERM;

PL89  EVENT,21,1;             LOOK TO SEE IF BLDG 89 NEEDED (LNQ 89)
      TERM;

PA89  EVENT,51,1;             LOOK TO SEE IF BLDG 89 NEEDED (AHEAD 89)
      TERM;


OUT   GOON,1;
      ACTIVITY,,TYPE.EQ.130,CLC1;
      ACTIVITY,TRIAG(.32,.4,.52,1),,FTEST;

;==================================================
;            BUILD
;==================================================

;*** BUILD UP FOR SPEEDLINE AND SPEEDLINE/PAINT ***

       ENTER,34,1;
       ACTIVITY;
```

```
BUILD  GOON,1;
       ACTIVITY/10;BUILD
       GOON,1;
       ACTIVITY,TRIAG(2.64,3.30,4.29,1),WORK.EQ.1,FTEST; SL ONLY BUILD
UP
       ACTIVITY,TRIAG(3.2,4.0,5.2,1),WORK.EQ.2,PPNT;    SL/PNT BUILD UP
       ACTIVITY,TRIAG(8,10,13,1),WORK.EQ.3,PPNT;
       ACTIVITY,TRIAG(16,20,30,1),WORK.EQ.4,PPNT;
       ACTIVITY,TRIAG(8,10,13,1),WORK.EQ.5.OR.WORK.EQ.6.OR.WORK.EQ.7;
       GOON,1;
       ACTIVITY,,WORK.EQ.5.OR.WORK.EQ.6,FTEST;
       ACTIVITY,,WORK.EQ.7,PPNT;
;
;=====================================================
;         FUNCTIONAL TEST
;=====================================================

      ENTER,38,1;
      ACTIVITY;
FTEST GOON,1;
      ACTIVITY/11;FTEST
      GOON,1;
      ACTIVITY,TRIAG(4.16,5.2,6.76,1),WORK.EQ.1.OR.WORK.EQ.2,FTEQ;
      ACTIVITY,TRIAG(5.2,6.5,8.45,1),WORK.GT.2.AND.WORK.NE.4,FTEQ;
      ACTIVITY,TRIAG(5.6,7,9.1,1),WORK.EQ.4,FTEQ;

FTEQ  AWAIT(17),FUNCTEST,1;
      ACTIVITY,TRIAG(4,5,6.5,1),WORK.EQ.1.OR.WORK.EQ.2,BAD;
      ACTIVITY,TRIAG(5.2,6.5,8.45,1),WORK.GT.2.AND.WORK.NE.4,BAD;
      ACTIVITY,TRIAG(5.6,7,8.45,1),WORK.EQ.4,BAD;

BAD   GOON,1;
      ACTIVITY,TRIAG(4,5,6.5,1),.7,FFT;
      ACTIVITY,,,FFT;

FFT   FREE,FUNCTEST,1;
      ACTIVITY,,,CLC1;

;=====================================================
;*************************************************
;
;    ALL ACTIVITIES COMPLETE, COLECT STATS
;
;*************************************************
;=====================================================

CLC1  GOON,1;
      ACTIVITY,,TYPE.EQ.141,FR41;
      ACTIVITY,,TYPE.EQ.130;
      FREE,IN_C130,1;
```

```
      ACTIVITY,,,CLC3;

FR41  FREE,IN_C141,1;
      ACTIVITY,,,CLC3;

CLC3  GOON,1;
      ACTIVITY/30,,WARM.EQ.1,WMRS;  REMOVE WARMERS
      ACTIVITY/31,,,CLAL;

CLAL  COLCT(1),INT(1),TIS ALL,,1;
      COLCT(2),ALL,ALL OUTPUT,,1;
      COLCT(3),ATRIB(22),WAIT IN WASH,,1;
      COLCT(4),ATRIB(23),WAIT IN DEPAINT,,1;
      COLCT(5),ATRIB(24),WAIT IN WEA,,1;
      COLCT(6),ATRIB(25),WAIT IN PAINT,,1;
      COLCT(7),ATRIB(26),TOTAL WAIT TIME,,1;
      ACTIVITY,,TNOW.GT.709,CLCN;
      ACTIVITY;
      COLCT(8),ALL,ALL BY FY93,,1;
      ACTIVITY,,,CLCN;

CLCN  GOON,1;
      ACTIVITY,,WORK.EQ.1.OR.WORK.EQ.5.OR.WORK.EQ.6,TYPS;NOT NEED PAINT
      ACTIVITY;
      COLCT(9),INT(1),TIS ALL PNT,,1;
      ACTIVITY,,,TYPS;

TYPS  GOON,1
      ACTIVITY,,TYPE.EQ.130,C30S;
      ACTIVITY,   PE.EQ.141,SORT;

C30S  GOON,1;
      ACTIVITY,,WORK.EQ.10,C300;
      ACTIVITY,,WORK.EQ.11,C301;

C300  GOON,1;
      COLCT(10),INT(1),C130 PATH 10,,1;
      ACTIVITY,,,C30T;

C301  GOON,1;
      COLCT(11),INT(1),C130 PATH 11,,1;
      ACTIVITY,,,C30T;

C30T  COLCT(12),INT(1),TIS C130,,1;
      COLCT(13),ALL,ALL C130,,1;
      ACTIVITY,,TNOW.GT.709,TRM1;
      ACTIVITY;
      COLCT(14),ALL,C130 BY FY93,,1;
      ACTIVITY,,,TRM1;
```

```
SORT  COLCT(15),INT(1),TIS C141,,1;
      COLCT(16),ALL,ALL C141,,1;
      ACTIVITY,,TNOW.GT.709,SRT1;
      ACTIVITY;
      COLCT(17),ALL,C141 BY FY93,,1;
      ACTIVITY,,,SRT1;

SRT1  GOON,1;
      ACTIVITY,,WORK.EQ.1.OR.WORK.EQ.6.OR.WORK.EQ.5,SRT2;
      ACTIVITY;
      COLCT(18),INT(1),C141 PAINT,,1;
      ACTIVITY,,,SRT2;

SRT2  GOON,1;
      ACTIVITY,,WORK.EQ.1,C411;
      ACTIVITY,,WORK.EQ.2,C412;
      ACTIVITY,,WORK.EQ.3,C413;
      ACTIVITY,,WORK.EQ.4,C414;
      ACTIVITY,,WORK.EQ.5,C415;
      ACTIVITY,,WORK.EQ.6,C416;
      ACTIVITY,,WORK.EQ.7,C417;

C411  COLCT(19),INT(1),TIS SL,,1;
      ACTIVITY,,,CLCT;
;
C412  COLCT(20),INT(1),TIS SL PT,,1;
      ACTIVITY,,,CLCT;
;
C413  COLCT(21),INT(1),TIS SL PDM PT,,1;
      ACTIVITY,,,CLCT;
;
C414  COLCT(22),INT(1),TIS CW,,1;
      ACTIVITY;
      COLCT(23),ALL,ALL CW,,1;
      ACTIVITY,,TNOW.GT.709,CLCT;
      ACTIVITY;
      COLCT(24),ALL,CW BY FY93,,1;
      ACTIVITY,,,CLCT;
;
C415  COLCT(25),INT(1),TIS PDM,,1;
      ACTIVITY,,,CLPD;
;
C416  COLCT(26),INT(1),TIS SL PDM,,1;
      ACTIVITY,,,CLCT;
;
C417  COLCT(27),INT(1),TIS PDM PAINT,,1;
      ACTIVITY,,,CLPD;
;
CLPD  COLCT(28),ALL,ALL PDM,,1;
      ACTIVITY,,TNOW.GT.709,CLCT;
```

```
      ACTIVITY;
      COLCT(29),ALL,PDM BY FY94,,1;
      ACTIVITY,,,CLCT;

WMRS  COLCT(30),BET,WARMERS,,1;;
      TERM;

CLCT  GOON,1;
      ACTIVITY,,WORK.EQ.4.OR.WORK.EQ.5.OR.WORK.EQ.7,TRM1;
      ACTIVITY;
      COLCT(31),ALL,SL AC OUT SYS,,1;
      ACTIVITY,,TNOW.GT.710,TRM1;
      ACTIVITY;
      COLCT(32),ALL,SL AC OUT BY FY93,,1;
      ACTIVITY;
TRM1  TERM,235;

TERM  TERM;
      END;
FIN
```

Modifications for Option 2

```
;=====================================================
;     C-130 WASH (INCOMMING & OUTGOING) BLDG 50
;=====================================================
;
      ENTER,32,1;
      ACTIVITY;
WASH  ASSIGN,NEED=1,ARV_TIME=TNOW,MK_WT=TNOW,1;
      ACTIVITY,,NNRSC(5).EQ.1,WSE4;  IF 50 BUSY
      ACTIVITY,,,WSEV;                    FILE ENTITY FILE
3

WSEV  EVENT,6,1;
FILEM(3,ATRIB)
      TERM;

      ENTER,4,1;
      ACTIVITY;
WSE4  AWAIT(10),BLDG_50,1;
      ACTIVITY;

ASSIGN,WASH_HGR=50,WASH_WT=TNOW-MK_WT,SUM_WT=SUM_WT+WASH_WT,
1;
      ACTIVITY,,,WASA;

WASA  GOON,1;
      ACTIVITY,TRIAG(.5,.65,.8,1);
      ASSIGN,X_WASH=X_WASH+1,1;
      ACTIVITY,TRIAG(.5,.65,.8,1),X_WASH.GE.2,WAAS;  SCUFF
SAND C-130
      ACTIVITY,,,WAAS;

WAAS  GOON,1;
      ACTIVITY,,WASH_HGR.EQ.50,WF50;

WF50  FREE,BLDG_50,2;
      ACTIVITY,,,WSGO;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,NNQ(10).GT.0,TERM;
      ACTIVITY;
      GOON,1;

ACTIVITY,,NNQ(3).EQ.0.AND.NNQ(4).EQ.0.AND.NNQ(5).EQ.0.AND.NN
Q(6).EQ.0,TERM;
      ACTIVITY;
WFREE GOON,1;
      ACTIVITY,,D_50.EQ.10,WC50;
```

```
      ACTIVITY,,D_50.EQ.13,WS50;
      ACTIVITY,,D_50.EQ.19,WL50;
      ACTIVITY,,D_50.EQ.42,WA50;
      ACTIVITY,,,TERM;

WC50  EVENT,10,1;             LOOK TO SEE IF BLDG 50 NEEDED
(LOOK 50)
      TERM;

WS50  EVENT,13,1;             LOOK TO SEE IF BLDG 50 NEEDED
(SPT 50)
      TERM;

WL50  EVENT,19,1;             LOOK TO SEE IF BLDG 50 NEEDED
(LNQ 50)
      TERM;

WA50  EVENT,42,1;             LOOK TO SEE IF BLDG 50 NEEDED
(AHEAD 50)
      TERM;

WSGO  GOON,1;
      ACTIVITY,,X_WASH.EQ.1,PD30;
      ACTIVITY,,X_WASH.EQ.2;
      GOON,1;
      ACTIVITY,TRIAG(1.6,2,2.6,1),,PAINT; INCLUDES C-130
PREP FOR PAINT
;
;=====================================================
;         PREP FOR DePAINT
;=====================================================
PREP  GOON,1;;
      ACTIVITY/1,TRIAG(4.56,5.70,7.41,1),,DEPT;DePaint
;
;=====================================================
;         DePAINT  (50 OR 54)
;=====================================================
;
      ENTER,36,1;
      ACTIVITY;
DEPT  GOON,1;
      ACTIVITY,,TYPE.EQ.130,DEP3;
      ACTIVITY,,TYPE.EQ.141,DP41;

DEP3  ASSIGN,NEED=1,ARV_TIME=TNOW,MK_WT=TNOW,1;
      ACTIVITY,,NNRSC(5).EQ.1.AND.NNQ(10).EQ.0,DPA7;
      ACTIVITY,,,DEPE;

DP41  ASSIGN,NEED=2,ARV_TIME=TNOW,MK_WT=TNOW,1;
      ACTIVITY,,NNRSC(3).EQ.1.AND.NNQ(11).EQ.0,DPA8;
```

```
      ACTIVITY,,,DEPE;

DEPE  EVENT,7,1;                        CALL FILEM(4,ATRIB)
      TERM;

      ENTER,7,1;
      ACTIVITY;
DPA7  AWAIT(10),BLDG_50,1;
      ACTIVITY;

ASSIGN,DPT_HGR=50,DP_WT=TNOW-MK_WT,SUM_WT=SUM_WT+DP_WT,1;
      ACTIVITY,,,DPTA;

      ENTER,8,1;
      ACTIVITY;
DPA8  AWAIT(11),BLDG_54,1;
      ACTIVITY;

ASSIGN,DPT_HGR=54,DP_WT=TNOW-MK_WT,SUM_WT=SUM_WT+DP_WT,1;
      ACTIVITY,,,DPTA;

DPTA  GOON,1;
      ACTIVITY,,DPT_HGR.EQ.50,DP50;
      ACTIVITY,,DPT_HGR.EQ.54,DP54;

DP54  GOON,1;
      ACTIVITY,TRIAG(3,4,5,1),TYPE.EQ.141,FRDP;

DP50  GOON,1;
      ACTIVITY,TRIAG(8,10,13,1),TYPE.EQ.130,FRDP;

FRDP  GOON,1;
      ACTIVITY,,DPT_HGR.EQ.54,DF54;
      ACTIVITY,,DPT_HGR.EQ.50,DF50;

DF54  FREE,BLDG_54,2;
      ACTIVITY,,,DPGO;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,NNQ(11).GT.0,TERM;
      ACTIVITY;
      GOON,1;

ACTIVITY,,NNQ(3).EQ.0.AND.NNQ(4).EQ.0.AND.NNQ(5).EQ.0,TERM;
      ACTIVITY;
DFREE GOON,1
      ACTIVITY,,D_54.EQ.11,DC54;
      ACTIVITY,,D_54.EQ.14,DS54;
      ACTIVITY,,D_54.EQ.20,DL54;
      ACTIVITY,,D_54.EQ.47,DA54;
```

```
DC54  EVENT,11,1;                 LOOK TO SEE IF BLDG 54 NEEDED
(LOOK 54)
      TERM;

DS54  EVENT,14,1;                 LOOK TO SEE IF BLDG 54 NEEDED
(SPT 54)
      TERM;

DL54  EVENT,20,1;                 LOOK TO SEE IF BLDG 54 NEEDED
(LNQ 54)
      TERM;

DA54  EVENT,47,1;                 LOOK TO SEE IF BLDG 54 NEEDED
(AHEAD 54)
      TERM;

DF50  FREE,BLDG_50,2;
      ACTIVITY,,,DPGO;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,D_50.EQ.10,DC50;
      ACTIVITY,,D_50.EQ.13,DS50;
      ACTIVITY,,D_50.EQ.19,DC50;
      ACTIVITY,,D_50.EQ.42,DC50;

DC50  EVENT,10,1;                 LOOK TO SEE IF BLDG 50 NEEDED
(LOOK 50)
      TERM;

DS50  EVENT,13,1;                 LOOK TO SEE IF BLDG 50 NEEDED
(SPT 50)
      TERM;

DL50  EVENT,19,1;                 LOOK TO SEE IF BLDG 50 NEEDED
(LNQ 50)
      TERM;

DA50  EVENT,42,1;                 LOOK TO SEE IF BLDG 50 NEEDED
(AHEAD 50)
      TERM;

DPGO  GOON,1
      ACTIVITY,,TYPE.EQ.130,PD30;
      ACTIVITY,,TYPE.EQ.141,DPG1;
;
DPG1  GOON,1;
      ACTIVITY,,WORK.EQ.4,CWBX;
      ACTIVITY,,WORK.EQ.7,PDM;
      ACTIVITY,,WORK.EQ.2.OR.WORK.EQ.3,SPLN;
```

```
;
;=====================================================
;          W/E/A
;=====================================================
;
      ENTER,35,1;
      ACTIVITY;
WEA   GOON,1;
      ACTIVITY,,TYPE.EQ.130,WE30;
      ACTIVITY,,TYPE.EQ.141,WE41;

WE30  ASSIGN,NEED=1,ARV_TIME=TNOW,MK_WT=TNOW,1;
      ACTIVITY,,NNRSC(5).EQ.1.AND.NNQ(10).EQ.0,WE10;  IF 50
BUSY
      ACTIVITY,,,WEEV;                              FILE
ENTITY (5)

WE41  ASSIGN,NEED=2,ARV_TIME=TNOW,MK_WT=TNOW,1;
      ACTIVITY,,NNRSC(3).EQ.1.AND.NNQ(11).EQ.0,WE11;  IF 50
BUSY
      ACTIVITY,,,WEEV;                              FILE
ENTITY (5)

WEEV  EVENT,8,1;                        CALL FILEM(5,ATRIB)
      TERM;

      ENTER,10,1;
      ACTIVITY;
WE10  AWAIT(10),BLDG_50,1;
      ACTIVITY;

ASSIGN,WEA_HGR=50,WEA_WT=TNOW-MK_WT,SUM_WT=SUM_WT+WEA_WT,1;
      ACTIVITY,,,WEAA;

      ENTER,11,1;
      ACTIVITY;
WE11  AWAIT(11),BLDG_54,1;
      ACTIVITY;

ASSIGN,WEA_HGR=54,WEA_WT=TNOW-MK_WT,SUM_WT=SUM_WT+WEA_WT,1;
      ACTIVITY,,,WEAA;

WEAA  GOON,1;
      ACTIVITY/8,TRIAG(.8,1,1.3,1);WEA
      GOON,1;
      ACTIVITY,,WEA_HGR.EQ.54,WEF54;
      ACTIVITY,,WEA_HGR.EQ.50;
```

```
      ASSIGN,PNT_HGR=50,PNT_WT=0,1;
      ACTIVITY,,,PNTA;

WEF54 FREE,BLDG_54,2;
      ACTIVITY,,,WEFE;
      ACTIVITY,,,WEFF;

WEFE  ASSIGN,NEED=3,MK_WT=TNOW,1;        NEED FOR PAINT
      ACTIVITY,,,PE15;

WEFF  GOON,1;
      ACTIVITY,,NNQ(11).GT.0,TERM;
      ACTIVITY;
      GOON,1;

ACTIVITY,,NNQ(3).EQ.0.AND.NNQ(4).EQ.0.AND.NNQ(5).EQ.0,TERM;
      ACTIVITY;
AFREE GOON,1;
      ACTIVITY,,D_54.EQ.11,EC54;
      ACTIVITY,,D_54.EQ.14,ES54;
      ACTIVITY,,D_54.EQ.20,EL54;
      ACTIVITY,,D_54.EQ.47,EA54;

EC54  EVENT,11,1;           LOOK TO SEE IF BLDG 54 NEEDED
(LOOK 54)
      TERM;

ES54  EVENT,14,1;           LOOK TO SEE IF BLDG 54 NEEDED
(SPT 54)
      TERM;

EL54  EVENT,20,1;           LOOK TO SEE IF BLDG 54 NEEDED
(LNQ 54)
      TERM;

EA54  EVENT,47,1;           LOOK TO SEE IF BLDG 54 NEEDED
(AHEAD 54)
      TERM;

;========================================================
;           PAINT  (50 OR 89)
;========================================================
;

PAINT GOON,1;
      ACTIVITY,,TYPE.EQ.130,P130;
      ACTIVITY,,TYPE.EQ.141,P141;

P130  ASSIGN,NEED=1,ARV_TIME=TNOW,MK_WT=TNOW,1;
      ACTIVITY,,NNRSC(5).EQ.1.AND.NNQ(10).EQ.0,PE14;
```

```
      ACTIVITY,,,PAEN;

P141  ASSIGN,NEED=3,ARV_TIME=TNOW,MK_WT=TNOW,1;
      ACTIVITY,,NNRSC(4).EQ.1.AND.NNQ(12).EQ.0,PE15;   89
BUSY
      ACTIVITY,,,PAEN;                                FILE
ENTITY (6)

PAEN  EVENT,9,1;                          CALL FILEM(6,ATRIB)
      TERM;

      ENTER,13,1;
      ACTIVITY;
PE14  AWAIT(10),BLDG_50,1;
      ACTIVITY;

ASSIGN,PNT_HGR=50,PNT_WT=TNOW-MK_WT,SUM_WT=SUM_WT+PNT_WT,1;
      ACTIVITY,,,PNTA;

      ENTER,15,1;
      ACTIVITY;
PE15  AWAIT(12),BLDG_89,1;
      ACTIVITY;

ASSIGN,PNT_HGR=89,PNT_WT=TNOW-MK_WT,SUM_WT=SUM_WT+PNT_WT,1;
      ACTIVITY,,,PNTA;

PNTA  GOON,1;
      ACTIVITY/9,TRIAG(3.2,4,5.2,1),TYPE.EQ.141,PTST;PAINT

ACTIVITY,TRIAG(2.4,3,3.9,1),TYPE.EQ.130.AND.WORK.EQ.10,PTST;

ACTIVITY,TRIAG(1.2,1.5,1.95,1),TYPE.EQ.130.AND.WORK.EQ.11,PT
ST;

PTST  GOON,1;
      ACTIVITY,,PNT_HGR.EQ.50,PF50;
      ACTIVITY,,PNT_HGR.EQ.89,PF89;

PF50  FREE,BLDG_50,2;
      ACTIVITY,,,OUT;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,NNQ(10).GT.0,TERM;
      ACTIVITY;
      GOON,1;

ACTIVITY,,NNQ(3).EQ.0.AND.NNQ(4).EQ.0.AND.NNQ(5).EQ.0.AND.NN
Q(6).EQ.0,TERM;
      ACTIVITY;
```

```
      GOON,1;
      ACTIVITY,,D_50.EQ.10,PC50;
      ACTIVITY,,D_50.EQ.13,PS50;
      ACTIVITY,,D_50.EQ.19,PL50;
      ACTIVITY,,D_50.EQ.42,PA50;

PC50  EVENT,10,1;              LOOK TO SEE IF BLDG 50 NEEDED
(LOOK 50)
      TERM;

PS50  EVENT,13,1;              LOOK TO SEE IF BLDG 50 NEEDED
(SPT 50)
      TERM;

PL50  EVENT,19,1;              LOOK TO SEE IF BLDG 50 NEEDED
(LNQ 50)
      TERM;

PA50  EVENT,42,1;              LOOK TO SEE IF BLDG 50 NEEDED
(AHEAD 50)
      TERM;

PF89  FREE,BLDG_89,2;
      ACTIVITY,,,OUT;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,NNQ(12).GT.0,TERM;
      ACTIVITY;
PFREE GOON,1;
      ACTIVITY,,D_89.EQ.12,PC89;
      ACTIVITY,,D_89.EQ.15,PS89;
      ACTIVITY,,D_89.EQ.21,PL89;
      ACTIVITY,,D_89.EQ.52,PA89;

PC89  EVENT,12,1;              LOOK TO SEE IF BLDG 89 NEEDED
(LOOK 89)
      TERM;

PS89  EVENT,15,1;              LOOK TO SEE IF BLDG 89 NEEDED
(SPT 89)
      TERM;

PL89  EVENT,21,1;              LOOK TO SEE IF BLDG 89 NEEDED
(LNQ 89)
      TERM;

PA89  EVENT,52,1;              LOOK TO SEE IF BLDG 89 NEEDED
(AHEAD 89)
      TERM;
```

```
OUT    GOON,1;
       ACTIVITY,,TYPE.EQ.130,CLC1;
       ACTIVITY,TRIAG(.32,.4,.52,1),,FTEST;
```

Modifications for Option 3

```
;=====================================================
;     C-130 WASH (INCOMMING & OUTGOING) BLDG 50
;=====================================================
;
      ENTER,32,1;
      ACTIVITY;
WASH  ASSIGN,NEED=1,ARV_TIME=TNOW,MK_WT=TNOW,1;
      ACTIVITY,,NNRSC(5).EQ.1,WSE4;  IF 50 BUSY
      ACTIVITY,,,WSEV;                    FILE ENTITY FILE
3

WSEV  EVENT,6,1;
FILEM(3,ATRIB)
      TERM;

      ENTER,4,1;
      ACTIVITY;
WSE4  AWAIT(10),BLDG_50,1;
      ACTIVITY;

ASSIGN,WASH_HGR=50,WASH_WT=TNOW-MK_WT,SUM_WT=SUM_WT+WASH_WT,
1;
      ACTIVITY,,,WASA;

WASA  GOON,1;
      ACTIVITY,TRIAG(.5,.65,.8,1);
      ASSIGN,X_WASH=X_WASH+1,1;
      ACTIVITY,TRIAG(.5,.65,.8,1),X_WASH.GE.2,WAAS;  SCUFF
SAND C-130
      ACTIVITY,,,WAAS;

WAAS  GOON,1;
      ACTIVITY,,WASH_HGR.EQ.50,WF50;

WF50  FREE,BLDG_50,2;
      ACTIVITY,,,WSGO;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,NNQ(10).GT.0,TERM;
      ACTIVITY;
      GOON,1;

ACTIVITY,,NNQ(3).EQ.0.AND.NNQ(4).EQ.0.AND.NNQ(5).EQ.0.AND.NN
Q(6).EQ.0,TERM;
      ACTIVITY;
WFREE GOON,1;
      ACTIVITY,,D_50.EQ.10,WC50;
```

```
      ACTIVITY,,D_50.EQ.13,WS50;
      ACTIVITY,,D_50.EQ.19,WL50;
      ACTIVITY,,D_50.EQ.42,WA50;
      ACTIVITY,,,TERM;

WC50  EVENT,10,1;             LOOK TO SEE IF BLDG 50 NEEDED
(LOOK 50)
      TERM;

WS50  EVENT,13,1;             LOOK TO SEE IF BLDG 50 NEEDED
(SPT 50)
      TERM;

WL50  EVENT,19,1;             LOOK TO SEE IF BLDG 50 NEEDED
(LNQ 50)
      TERM;

WA50  EVENT,42,1;             LOOK TO SEE IF BLDG 50 NEEDED
(AHEAD 50)
      TERM;

WSGO  GOON,1;
      ACTIVITY,,X_WASH.EQ.1,PD30;
      ACTIVITY,,X_WASH.EQ.2;
      GOON,1;
      ACTIVITY,TRIAG(1.6,2,2.6,1),,PAINT; INCLUDES C-130
PREP FOR PAINT
;
;======================================================
;         PREP FOR DePAINT
;======================================================
PREP  GOON,1;;
      ACTIVITY/1,TRIAG(4.56,5.70,7.41,1),,DEPT;DePaint
;
;======================================================
;         DePAINT  (50 OR 54)
;======================================================
;
      ENTER,36,1;
      ACTIVITY;
DEPT  GOON,1;
      ACTIVITY,,TYPE.EQ.130,DEP3;
      ACTIVITY,,TYPE.EQ.141,DP41;

DEP3  ASSIGN,NEED=1,ARV_TIME=TNOW,MK_WT=TNOW,1;
      ACTIVITY,,NNRSC(5).EQ.1.AND.NNQ(10).EQ.0,DPA7;
      ACTIVITY,,,DEPE;

DP41  ASSIGN,NEED=2,ARV_TIME=TNOW,MK_WT=TNOW,1;
      ACTIVITY,,NNRSC(3).EQ.1.AND.NNQ(11).EQ.0,DPA8;
```

```
      ACTIVITY,,,DEPE;

DEPE  EVENT,7,1;                              CALL FILEM(4,ATRIB)
      TERM;

      ENTER,7,1;
      ACTIVITY;
DPA7  AWAIT(10),BLDG_50,1;
      ACTIVITY;

ASSIGN,DPT_HGR=50,DP_WT=TNOW-MK_WT,SUM_WT=SUM_WT+DP_WT,1;
      ACTIVITY,,,DPTA;

      ENTER,8,1;
      ACTIVITY;
DPA8  AWAIT(11),BLDG_54,1;
      ACTIVITY;

ASSIGN,DPT_HGR=54,DP_WT=TNOW-MK_WT,SUM_WT=SUM_WT+DP_WT,1;
      ACTIVITY,,,DPTA;

DPTA  GOON,1;
      ACTIVITY,,DPT_HGR.EQ.50,DP50;
      ACTIVITY,,DPT_HGR.EQ.54,DP54;

DP54  GOON,1;
      ACTIVITY,TRIAG(3,4,5,1),TYPE.EQ.141,FRDP;

DP50  GOON,1;
      ACTIVITY,TRIAG(8,10,13,1),TYPE.EQ.130,FRDP;

FRDP  GOON,1;
      ACTIVITY,,DPT_HGR.EQ.54,DF54;
      ACTIVITY,,DPT_HGR.EQ.50,DF50;

DF54  FREE,BLDG_54,2;
      ACTIVITY,,,DPGO;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,NNQ(11).GT.0,TERM;
      ACTIVITY;
      GOON,1;

ACTIVITY,,NNQ(3).EQ.0.AND.NNQ(4).EQ.0.AND.NNQ(5).EQ.0,TERM;
      ACTIVITY;
DFREE GOON,1
      ACTIVITY,,D_54.EQ.11,DC54;
      ACTIVITY,,D_54.EQ.14,DS54;
      ACTIVITY,,D_54.EQ.20,DL54;
      ACTIVITY,,D_54.EQ.47,DA54;
```

```
DC54   EVENT,11,1;                LOOK TO SEE IF BLDG 54 NEEDED
(LOOK 54)
       TERM;

DS54   EVENT,14,1;                LOOK TO SEE IF BLDG 54 NEEDED
(SPT 54)
       TERM;

DL54   EVENT,20,1;                LOOK TO SEE IF BLDG 54 NEEDED
(LNQ 54)
       TERM;

DA54   EVENT,47,1;                LOOK TO SEE IF BLDG 54 NEEDED
(AHEAD 54)
       TERM;

DF50   FREE,BLDG_50,2;
       ACTIVITY,,,DPGO;
       ACTIVITY;
       GOON,1;
       ACTIVITY,,D_50.EQ.10,DC50;
       ACTIVITY,,D_50.EQ.13,DS50;
       ACTIVITY,,D_50.EQ.19,DC50;
       ACTIVITY,,D_50.EQ.42,DC50;

DC50   EVENT,10,1;                LOOK TO SEE IF BLDG 50 NEEDED
(LOOK 50)
       TERM;

DS50   EVENT,13,1;                LOOK TO SEE IF BLDG 50 NEEDED
(SPT 50)
       TERM;

DL50   EVENT,19,1;                LOOK TO SEE IF BLDG 50 NEEDED
(LNQ 50)
       TERM;

DA50   EVENT,42,1;                LOOK TO SEE IF BLDG 50 NEEDED
(AHEAD 50)
       TERM;

DPGO   GOON,1
       ACTIVITY,,TYPE.EQ.130,PD30;
       ACTIVITY,,TYPE.EQ.141,DPG1;
;
DPG1   GOON,1;
       ACTIVITY,,WORK.EQ.4,CWBX;
       ACTIVITY,,WORK.EQ.7,PDM;
;
```

```
;====================================================
;          W/E/A
;====================================================
;
      ENTER,35,1;
      ACTIVITY;
WEA   GOON,1;
      ACTIVITY,,TYPE.EQ.130,WE30;
      ACTIVITY,,TYPE.EQ.141,WE41;

WE30  ASSIGN,NEED=1,ARV_TIME=TNOW,MK_WT=TNOW,1;
      ACTIVITY,,NNRSC(5).EQ.1.AND.NNQ(10).EQ.0,WE10;  IF 50
BUSY
      ACTIVITY,,,WEEV;                                FILE
ENTITY (5)

WE41  ASSIGN,NEED=2,ARV_TIME=TNOW,MK_WT=TNOW,1;
      ACTIVITY,,NNRSC(3).EQ.1.AND.NNQ(11).EQ.0,WE11;  IF 50
BUSY
      ACTIVITY,,,WEEV;                                FILE
ENTITY (5)

WEEV  EVENT,8,1;                         CALL FILEM(5,ATRIB)
      TERM;

      ENTER,10,1;
      ACTIVITY;
WE10  AWAIT(10),BLDG_50,1;
      ACTIVITY;

ASSIGN,WEA_HGR=50,WEA_WT=TNOW-MK_WT,SUM_WT=SUM_WT+WEA_WT,1;
      ACTIVITY,,,WEAA;

      ENTER,11,1;
      ACTIVITY;
WE11  AWAIT(11),BLDG_54,1;
      ACTIVITY;

ASSIGN,WEA_HGR=54,WEA_WT=TNOW-MK_WT,SUM_WT=SUM_WT+WEA_WT,1;
      ACTIVITY,,,WEAA;

WEAA  GOON,1;
      ACTIVITY/8,TRIAG(.8,1,1.3,1);WEA
      GOON,1;
      ACTIVITY,,WEA_HGR.EQ.54,WEF54;
      ACTIVITY,,WEA_HGR.EQ.50;
      ASSIGN,PNT_HGR=50,PNT_WT=0,1;
      ACTIVITY,,,PNTA;

WEF54 FREE,BLDG_54,2;
```

```
      ACTIVITY,,,WEFE;
      ACTIVITY,,,WEFF;

WEFE  ASSIGN,NEED=3,MK_WT=TNOW,1;        NEED FOR PAINT
      ACTIVITY,,NRUSE(4).EQ.0,PE15;
      ACTIVITY,,NRUSE(5).EQ.0,PE14;
      ACTIVITY,,,PE15;

WEFF  GOON,1;
      ACTIVITY,,NNQ(11).GT.0,TERM;
      ACTIVITY;
      GOON,1;

ACTIVITY,,NNQ(3).EQ.0.AND.NNQ(4).EQ.0.AND.NNQ(5).EQ.0,TERM;
      ACTIVITY;
AFREE GOON,1;
      ACTIVITY,,D_54.EQ.11,EC54;
      ACTIVITY,,D_54.EQ.14,ES54;
      ACTIVITY,,D_54.EQ.20,EL54;
      ACTIVITY,,D_54.EQ.47,EA54;

EC54  EVENT,11,1;             LOOK TO SEE IF BLDG 54 NEEDED
(LOOK 54)
      TERM;

ES54  EVENT,14,1;             LOOK TO SEE IF BLDG 54 NEEDED
(SPT 54)
      TERM;

EL54  EVENT,20,1;             LOOK TO SEE IF BLDG 54 NEEDED
(LNQ 54)
      TERM;

EA54  EVENT,47,1;             LOOK TO SEE IF BLDG 54 NEEDED
(AHEAD 54)
      TERM;

;=======================================================
;           PAINT  (50 OR 89)
;=======================================================
;

PAINT GOON,1;
      ACTIVITY,,TYPE.EQ.130,P130;
      ACTIVITY,,TYPE.EQ.141,P141;

P130  ASSIGN,NEED=1,ARV_TIME=TNOW,MK_WT=TNOW,1;
      ACTIVITY,,NNRSC(5).EQ.1.AND.NNQ(10).EQ.0,PE14;
      ACTIVITY,,,PAEN;
```

```
P141  ASSIGN,NEED=3,ARV_TIME=TNOW,MK_WT=TNOW,1;
      ACTIVITY,,NNRSC(4).EQ.1.AND.NNQ(12).EQ.0,PE15;   89
BUSY
      ACTIVITY,,,PAEN;                                FILE
ENTITY (6)

PAEN  EVENT,9,1;                          CALL FILEM(6,ATRIB)
      TERM;

      ENTER,13,1;
      ACTIVITY;
PE14  AWAIT(10),BLDG_50,1;
      ACTIVITY;

ASSIGN,PNT_HGR=50,PNT_WT=TNOW-MK_WT,SUM_WT=SUM_WT+PNT_WT,1;
      ACTIVITY,,,PNTA;

      ENTER,15,1;
      ACTIVITY;
PE15  AWAIT(12),BLDG_89,1;
      ACTIVITY;

ASSIGN,PNT_HGR=89,PNT_WT=TNOW-MK_WT,SUM_WT=SUM_WT+PNT_WT,1;
      ACTIVITY,,,PNTA;

PNTA  GOON,1;
      ACTIVITY/9,TRIAG(3.2,4,5.2,1),TYPE.EQ.141,PTST;PAINT

ACTIVITY,TRIAG(2.4,3,3.9,1),TYPE.EQ.130.AND.WORK.EQ.10,PTST;

ACTIVITY,TRIAG(1.2,1.5,1.95,1),TYPE.EQ.130.AND.WORK.EQ.11,PT
ST;

PTST  GOON,1;
      ACTIVITY,,PNT_HGR.EQ.50,PF50;
      ACTIVITY,,PNT_HGR.EQ.89,PF89;

PF50  FREE,BLDG_50,2;
      ACTIVITY,,,OUT;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,NNQ(10).GT.0,TERM;
      ACTIVITY;
      GOON,1;

ACTIVITY,,NNQ(3).EQ.0.AND.NNQ(4).EQ.0.AND.NNQ(5).EQ.0.AND.NN
Q(6).EQ.0,TERM;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,D_50.EQ.10,PC50;
```

```
      ACTIVITY,,D_50.EQ.13,PS50;
      ACTIVITY,,D_50.EQ.19,PL50;
      ACTIVITY,,D_50.EQ.42,PA50;

PC50  EVENT,10,1;                LOOK TO SEE IF BLDG 50 NEEDED
(LOOK 50)
      TERM;

PS50  EVENT,13,1;                LOOK TO SEE IF BLDG 50 NEEDED
(SPT 50)
      TERM;

PL50  EVENT,19,1;                LOOK TO SEE IF BLDG 50 NEEDED
(LNQ 50)
      TERM;

PA50  EVENT,42,1;                LOOK TO SEE IF BLDG 50 NEEDED
(AHEAD 50)
      TERM;

PF89  FREE,BLDG_89,2;
      ACTIVITY,,,OUT;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,NNQ(12).GT.0,TERM;
      ACTIVITY;
PFREE GOON,1;
      ACTIVITY,,D_89.EQ.12,PC89;
      ACTIVITY,,D_89.EQ.15,PS89;
      ACTIVITY,,D_89.EQ.21,PL89;
      ACTIVITY,,D_89.EQ.52,PA89;

PC89  EVENT,12,1;                LOOK TO SEE IF BLDG 89 NEEDED
(LOOK 89)
      TERM;

PS89  EVENT,15,1;                LOOK TO SEE IF BLDG 89 NEEDED
(SPT 89)
      TERM;

PL89  EVENT,21,1;                LOOK TO SEE IF BLDG 89 NEEDED
(LNQ 89)
      TERM;

PA89  EVENT,52,1;                LOOK TO SEE IF BLDG 89 NEEDED
(AHEAD 89)
      TERM;

OUT   GOON,1;
      ACTIVITY,,TYPE.EQ.130,CLC1;
```

```
ACTIVITY,TRIAG(.32,.4,.52,1),,FTEST;
```

Modifications for Option 5

```
;==================================================
;     C-130 WASH (INCOMMING & OUTGOING) BLDG 50
;==================================================
;
      ENTER,32,1;
      ACTIVITY;
WASH  ASSIGN,NEED=4,ARV_TIME=TNOW,MK_WT=TNOW,1;
      ACTIVITY;
      EVENT,26,1;
      TERM;

      ENTER,4,1;
      ACTIVITY;
WSE4  AWAIT(10),BLDG_50,1;
      ACTIVITY;

ASSIGN,WASH_HGR=50,WASH_WT=TNOW-MK_WT,SUM_WT=SUM_WT+WASH_WT,
1;
      ACTIVITY,,,WASA;

      ENTER,5,1;
      ACTIVITY;
WSE5  AWAIT(11),BLDG_54,1;
      ACTIVITY;

ASSIGN,WASH_HGR=54,WASH_WT=TNOW-MK_WT,SUM_WT=SUM_WT+WASH_WT,
1;
      ACTIVITY,,,WASA;

WASA  GOON,1;
      ACTIVITY,TRIAG(.5,.65,.8,1);
      ASSIGN,X_WASH=X_WASH+1,1;
      ACTIVITY,TRIAG(.5,.65,.8,1),X_WASH.GE.2,WAAS;     SCUFF
SAND C130
      ACTIVITY,,,WAAS;

WAAS  GOON,1
      ACTIVITY,,WASH_HGR.EQ.50,WF50;
      ACTIVITY,,WASH_HGR.EQ.54,WF54;

WF50  FREE,BLDG_50,2;
      ACTIVITY,,,WSGO;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,NNQ(10).GT.0,TERM;
      ACTIVITY;
      GOON,1;
```

```
ACTIVITY,,NNQ(3).EQ.0.AND.NNQ(4).EQ.0.AND.NNQ(5).EQ.0.AND.NN
Q(6).EQ.0,TERM;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,D_50.EQ.10,WC50;
      ACTIVITY,,D_50.EQ.13,WS50;
      ACTIVITY,,D_50.EQ.19,WL50;
      ACTIVITY,,D_50.EQ.44,WA50;
      ACTIVITY,,,TERM;

WC50  EVENT,10,1;           LOOK TO SEE IF BLDG 50 NEEDED
(LOOK 50)
      TERM;

WS50  EVENT,13,1;           LOOK TO SEE IF BLDG 50 NEEDED
(SPT 50)
      TERM;

WL50  EVENT,19,1;           LOOK TO SEE IF BLDG 50 NEEDED
(LNQ 50)
      TERM;

WA50  EVENT,44,1;           LOOK TO SEE IF BLDG 50 NEEDED
(AHEAD 50)
      TERM;

WF54  FREE,BLDG_54,2;
      ACTIVITY,,,WSGO;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,NNQ(11).GT.0,TERM;
      ACTIVITY;
      GOON,1;

ACTIVITY,,NNQ(3).EQ.0.AND.NNQ(4).EQ.0.AND.NNQ(5).EQ.0,TERM;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,D_54.EQ.11,WC54;
      ACTIVITY,,D_54.EQ.14,WS54;
      ACTIVITY,,D_54.EQ.20,WL54;
      ACTIVITY,,D_54.EQ.49,WA54;

WC54  EVENT,11,1;           LOOK TO SEE IF BLDG 54 NEEDED
(LOOK 54)
      TERM;

WS54  EVENT,14,1;           LOOK TO SEE IF BLDG 54 NEEDED
(SPT 54)
      TERM;
```

```
WL54  EVENT,20,1;               LOOK TO SEE IF BLDG 54 NEEDED
(LNQ 54)
      TERM;

WA54  EVENT,49,1;               LOOK TO SEE IF BLDG 54 NEEDED
(AHEAD 54)
      TERM;

WSGO  GOON,1;
      ACTIVITY,,X_WASH.EQ.1,PD30;
      ACTIVITY,,X_WASH.EQ.2;
      GOON,1;
      ACTIVITY,TRIAG(1.6,2,2.6,1),,PAINT; INCLUDES C-130
PREP FOR PAINT
;
;=====================================================
;         PREP FOR DePAINT
;=====================================================
PREP  GOON,1;;
      ACTIVITY/1,TRIAG(4.56,5.70,7.41,1),,DEPT;DePaint
;
;=====================================================
;         DePAINT  (50 OR 54)
;=====================================================
;
      ENTER,36,1;
      ACTIVITY;
DEPT  GOON,1;
      ACTIVITY,,TYPE.EQ.130,DEP3;
      ACTIVITY,,TYPE.EQ.141,DP41;

DEP3  ASSIGN,NEED=1,ARV_TIME=TNOW,MK_WT=TNOW,1;
      ACTIVITY,,D_DP.EQ.27,DP27;
      ACTIVITY,,D_DP.EQ.23,DP23;

DP23  EVENT,23,1;
      TERM;

DP27  EVENT,27,1;
      TERM;

DP41  ASSIGN,NEED=2,ARV_TIME=TNOW,MK_WT=TNOW,1;
      ACTIVITY,,D_DP.EQ.27,DP27;
      ACTIVITY,,D_DP.EQ.23,DP23;

      ENTER,7,1;
      ACTIVITY;
DPA7  AWAIT(10),BLDG_50,1;
      ACTIVITY;
```

```
ASSIGN,DPT_HGR=50,DP_WT=TNOW-MK_WT,SUM_WT=SUM_WT+DP_WT,1;
      ACTIVITY,,,DPTA;

      ENTER,8,1;
      ACTIVITY;
DPA8  AWAIT(11),BLDG_54,1;
      ACTIVITY;

ASSIGN,DPT_HGR=54,DP_WT=TNOW-MK_WT,SUM_WT=SUM_WT+DP_WT,1;
      ACTIVITY,,,DPTA;

DPTA  GOON,1;
      ACTIVITY,,DPT_HGR.EQ.50,DP50;
      ACTIVITY,,DPT_HGR.EQ.54,DP54;

DP50  GOON,1;
      ACTIVITY,TRIAG(8,10,13,1),TYPE.EQ.130,FRDP;

DP54  GOON,1;
      ACTIVITY,TRIAG(3,4,5,1),TYPE.EQ.141,FRDP;

FRDP  GOON,1;
      ACTIVITY,,DPT_HGR.EQ.54,DF54;
      ACTIVITY,,DPT_HGR.EQ.50,DF50;

DF50  FREE,BLDG_50,2;
      ACTIVITY,,,DPGO;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,NNQ(10).GT.0,TERM;
      ACTIVITY;
      GOON,1;

ACTIVITY,,NNQ(3).EQ.0.AND.NNQ(4).EQ.0.AND.NNQ(5).EQ.0.AND.NN
Q(6).EQ.0,TERM;
      ACTIVITY;
      GOON,1
      ACTIVITY,,D_50.EQ.10,DC50;
      ACTIVITY,,D_50.EQ.13,DS50;
      ACTIVITY,,D_50.EQ.19,DL50;
      ACTIVITY,,D_50.EQ.44,DA50;

DC50  EVENT,10,1;             LOOK TO SEE IF BLDG 50 NEEDED
(LOOK 50)
      TERM;

DS50  EVENT,13,1;             LOOK TO SEE IF BLDG 50 NEEDED
(SPT 50)
      TERM;
```

```
DL50  EVENT,19,1;                LOOK TO SEE IF BLDG 50 NEEDED
(LNQ 50)
      TERM;

DA50  EVENT,44,1;                LOOK TO SEE IF BLDG 50 NEEDED
(AHEAD 50)
      TERM;

DF54  FREE,BLDG_54,2;
      ACTIVITY,,,DPGO;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,NNQ(11).GT.0,TERM;
      ACTIVITY;
      GOON,1;

ACTIVITY,,NNQ(3).EQ.0.AND.NNQ(4).EQ.0.AND.NNQ(5).EQ.0,TERM;
      ACTIVITY;
      GOON,1
      ACTIVITY,,D_54.EQ.11,DC54;
      ACTIVITY,,D_54.EQ.14,DS54;
      ACTIVITY,,D_54.EQ.20,DL54;
      ACTIVITY,,D_54.EQ.49,DA54;

DC54  EVENT,11,1;                LOOK TO SEE IF BLDG 54 NEEDED
(LOOK 54)
      TERM;

DS54  EVENT,14,1;                LOOK TO SEE IF BLDG 54 NEEDED
(SPT 54)
      TERM;

DL54  EVENT,20,1;                LOOK TO SEE IF BLDG 54 NEEDED
(LNQ 54)
      TERM;

DA54  EVENT,49,1;                LOOK TO SEE IF BLDG 54 NEEDED
(AHEAD 54)
      TERM;

DPGO  GOON,1
      ACTIVITY,,TYPE.EQ.130,PD30;
      ACTIVITY,,TYPE.EQ.141,DPG1;
;
DPG1  GOON,1;
      ACTIVITY,,WORK.EQ.4,CWBX;
      ACTIVITY,,WORK.EQ.7,PDM;
      ACTIVITY,,WORK.EQ.2.OR.WORK.EQ.3,SPLN;
```

```
;=====================================================
;            W/E/A  (50 OR 54)
;======================================================
;
      ENTER,35,1;
      ACTIVITY;
WEA   ASSIGN,NEED=4,ARV_TIME=TNOW,MK_WT=TNOW,1;
      ACTIVITY,,D_WEA.EQ.24,DW24;
      ACTIVITY,,D_WEA.EQ.28,DW28;

DW24  EVENT,24,1;
      TERM;

DW28  EVENT,28,1;
      TERM;

WEEV  EVENT,8,1;                         CALL FILEM(5,ATRIB)
      TERM;

      ENTER,10,1;
      ACTIVITY;
WE10  AWAIT(10),BLDG_50,1;
      ACTIVITY;

ASSIGN,WEA_HGR=50,WEA_WT=TNOW-MK_WT,SUM_WT=SUM_WT+WEA_WT,1;
      ACTIVITY,,,WEAA;

      ENTER,11,1;
      ACTIVITY;
WE11  AWAIT(11),BLDG_54,1;
      ACTIVITY;

ASSIGN,WEA_HGR=54,WEA_WT=TNOW-MK_WT,SUM_WT=SUM_WT+WEA_WT,1;
      ACTIVITY,,,WEAA;

WEAA  GOON,1;
      ACTIVITY/8,TRIAG(.8,1,1.3,1);WEA
      GOON,1;
      ACTIVITY,,WEA_HGR.EQ.54,WEF54;
      ACTIVITY,,WEA_HGR.EQ.50;
      ASSIGN,PNT_HGR=50,PNT_WT=0,1;
      ACTIVITY,,,PNTA;

WEF54 FREE,BLDG_54,2;
      ACTIVITY,,,WEFE;
      ACTIVITY,,,WEFF;

WEFE  ASSIGN,NEED=5,MK_WT=TNOW,1;        NEED FOR PAINT
      ACTIVITY,,NRUSE(4).EQ.0,PE15;
      ACTIVITY,,NRUSE(5).EQ.0,PE14;
```

```
      ACTIVITY;
      EVENT,56,1;
      TERM;

WEFF  GOON,1;
      ACTIVITY,,NNQ(11).GT.0,TERM;
      ACTIVITY;
      GOON,1;

ACTIVITY,,NNQ(3).EQ.0.AND.NNQ(4).EQ.0.AND.NNQ(5).EQ.0,TERM;
      ACTIVITY;
AFREE GOON,1;
      ACTIVITY,,D_54.EQ.11,EC54;
      ACTIVITY,,D_54.EQ.14,ES54;
      ACTIVITY,,D_54.EQ.20,EL54;
      ACTIVITY,,D_54.EQ.49,EA54;

EC54  EVENT,11,1;            LOOK TO SEE IF BLDG 54 NEEDED
(LOOK 54)
      TERM;

ES54  EVENT,14,1;            LOOK TO SEE IF BLDG 54 NEEDED
(SPT 54)
      TERM;

EL54  EVENT,20,1;            LOOK TO SEE IF BLDG 54 NEEDED
(LNQ 54)
      TERM;

EA54  EVENT,49,1;            LOOK TO SEE IF BLDG 54 NEEDED
(AHEAD 54)
      TERM;

;=======================================================
;           PAINT  (50 OR 89)
;=======================================================
;

PAINT ASSIGN,NEED=5,ARV_TIME=TNOW,MK_WT=TNOW,1;
      ACTIVITY,,D_PNT.EQ.25,DP25;
      ACTIVITY,,D_PNT.EQ.29,DP29;

DP25  EVENT,25,1;
      TERM;

DP29  EVENT,29,1;
      TERM;

      ENTER,13,1;
      ACTIVITY;
```

```
PE14  AWAIT(10),BLDG_50,1;
      ACTIVITY;

ASSIGN,PNT_HGR=50,PNT_WT=TNOW-MK_WT,SUM_WT=SUM_WT+PNT_WT,1;
      ACTIVITY,,,PNTA;

      ENTER,15,1;
      ACTIVITY;
PE15  AWAIT(12),BLDG_89,1;
      ACTIVITY;

ASSIGN,PNT_HGR=89,PNT_WT=TNOW-MK_WT,SUM_WT=SUM_WT+PNT_WT,1;
      ACTIVITY,,,PNTA;

PNTA  GOON,1;
      ACTIVITY/9,TRIAG(3.2,4,5.2,1),TYPE.EQ.141,PTST;PAINT

ACTIVITY,TRIAG(2.4,3,3.9,1),TYPE.EQ.130.AND.WORK.EQ.10,PTST;

ACTIVITY,TRIAG(1.2,1.5,1.95,1),TYPE.EQ.130.AND.WORK.EQ.11,PT
ST;

PTST  GOON,1;
      ACTIVITY,,PNT_HGR.EQ.50,PF50;
      ACTIVITY,,PNT_HGR.EQ.89,PF89;

PF50  FREE,BLDG_50,2;
      ACTIVITY,,,OUT;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,NNQ(10).GT.0,TERM;
      ACTIVITY;
      GOON,1;

ACTIVITY,,NNQ(3).EQ.0.AND.NNQ(4).EQ.0.AND.NNQ(5).EQ.0.AND.NN
Q(6).EQ.0,TERM;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,D_50.EQ.10,PC50;
      ACTIVITY,,D_50.EQ.13,PS50;
      ACTIVITY,,D_50.EQ.19,PL50;
      ACTIVITY,,D_50.EQ.44,PA50;

PC50  EVENT,10,1;             LOOK TO SEE IF BLDG 50 NEEDED
(LOOK 50)
      TERM;

PS50  EVENT,13,1;             LOOK TO SEE IF BLDG 50 NEEDED
(SPT 50)
      TERM;
```

```
PL50  EVENT,19,1;              LOOK TO SEE IF BLDG 50 NEEDED
(LNQ 50)
      TERM;

PA50  EVENT,44,1;              LOOK TO SEE IF BLDG 50 NEEDED
(AHEAD 50)
      TERM;

PF89  FREE,BLDG_89,2;
      ACTIVITY,,,OUT;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,NNQ(12).GT.0,TERM;
      ACTIVITY;
PFREE GOON,1;
      ACTIVITY,,D_89.EQ.12,PC89;
      ACTIVITY,,D_89.EQ.15,PS89;
      ACTIVITY,,D_89.EQ.21,PL89;
      ACTIVITY,,D_89.EQ.54,PA89;

PC89  EVENT,12,1;              LOOK TO SEE IF BLDG 89 NEEDED
(LOOK 89)
      TERM;

PS89  EVENT,15,1;              LOOK TO SEE IF BLDG 89 NEEDED
(SPT 89)
      TERM;

PL89  EVENT,21,1;              LOOK TO SEE IF BLDG 89 NEEDED
(LNQ 89)
      TERM;

PA89  EVENT,54,1;              LOOK TO SEE IF BLDG 89 NEEDED
(AHEAD 89)
      TERM;


OUT   GOON,1;
      ACTIVITY,,TYPE.EQ.130,CLC1;
      ACTIVITY,TRIAG(.32,.4,.52,1),,FTEST;
```

Modifications for Option 6

```
;
;=====================================================
;      C-130 WASH (INCOMMING & OUTGOING) BLDG 50
;=====================================================
;
EN32   ENTER,32,1;
       ACTIVITY;
WASH   ASSIGN,NEED=6,ARV_TIME=TNOW,MK_WT=TNOW,1;
       ACTIVITY,,D_WASH.EQ.22,DP22;
       ACTIVITY,,D_WASH.EQ.26,DP26;

DP22   EVENT,22,1;   BUILDING DISPATCHING (MINUWASH)
       TERM;

DP26   EVENT,26,1;   BUILDING DISPATCHING (FCWASH)
       TERM;

EN4    ENTER,4,1;
       ACTIVITY;
WSE4   AWAIT(10),BLDG_50,1;
       ACTIVITY;

ASSIGN,WASH_HGR=50,WASH_WT=TNOW-MK_WT,SUM_WT=SUM_WT+WASH_WT,
1;
       ACTIVITY,,,WASA;

EN5    ENTER,5,1;
       ACTIVITY;
WSE5   AWAIT(11),BLDG_54,1;
       ACTIVITY;

ASSIGN,WASH_HGR=54,WASH_WT=TNOW-MK_WT,SUM_WT=SUM_WT+WASH_WT,
1;
       ACTIVITY,,,WASA;

EN6    ENTER,6,1;
       ACTIVITY;
WSE6   AWAIT(12),BLDG_89,1;
       ACTIVITY;

ASSIGN,WASH_HGR=89,WASH_WT=TNOW-MK_WT,SUM_WT=SUM_WT+WASH_WT,
1;
       ACTIVITY,,,WASA;

WASA   GOON,1;
       ACTIVITY,TRIAG(.5,.65,.8,1);
       ASSIGN,X_WASH=X_WASH+1,1;
       ACTIVITY,TRIAG(.5,.65,.8,1),X_WASH.GE.2,WAAS;
```

```
      ACTIVITY,,X_WASH.LT.2,WAAS;

WAAS  GOON,1;
      ACTIVITY,,WASH_HGR.EQ.50,WF50;
      ACTIVITY,,WASH_HGR.EQ.54,WF54;
      ACTIVITY,,WASH_HGR.EQ.89,WF89;

WF50  FREE,BLDG_50,2;
      ACTIVITY,,,WSGO;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,NNQ(10).GT.0,TERM;
      ACTIVITY;
      GOON,1;

ACTIVITY,,NNQ(3).EQ.0.AND.NNQ(4).EQ.0.AND.NNQ(5).EQ.0.AND.NN
Q(6).EQ.0,TERM;
      ACTIVITY;
WFREE GOON,1;
      ACTIVITY,,D_50.EQ.10,WC50;
      ACTIVITY,,D_50.EQ.16,WS50;
      ACTIVITY,,D_50.EQ.19,WL50;
      ACTIVITY,,D_50.EQ.45,WA50;
      ACTIVITY,,,TERM;

WC50  EVENT,10,1;             LOOK TO SEE IF BLDG 50 NEEDED
(LOOK 50)
      TERM;

WS50  EVENT,16,1;             LOOK TO SEE IF BLDG 50 NEEDED
(SPT_6 50)
      TERM;

WL50  EVENT,19,1;             LOOK TO SEE IF BLDG 50 NEEDED
(LNQ 50)
      TERM;

WA50  EVENT,45,1;             LOOK TO SEE IF BLDG 50 NEEDED
(AHEAD 50)
      TERM;

WF54  FREE,BLDG_54,2;
      ACTIVITY,,,WSGO;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,NNQ(11).GT.0,TERM;
      ACTIVITY;
      GOON,1;

ACTIVITY,,NNQ(3).EQ.0.AND.NNQ(4).EQ.0.AND.NNQ(5).EQ.0.AND.NN
```

```
Q(6).EQ.0,TERM;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,D_54.EQ.11,WC54;
      ACTIVITY,,D_54.EQ.17,WS54;
      ACTIVITY,,D_54.EQ.20,WL54;
      ACTIVITY,,D_54.EQ.50,WA54;

WC54  EVENT,11,1;            LOOK TO SEE IF BLDG 54 NEEDED
(LOOK 54)
      TERM;

WS54  EVENT,17,1;            LOOK TO SEE IF BLDG 54 NEEDED
(SPT_6 54)
      TERM;

WL54  EVENT,20,1;            LOOK TO SEE IF BLDG 54 NEEDED
(LNQ 54)
      TERM;

WA54  EVENT,50,1;            LOOK TO SEE IF BLDG 54 NEEDED
(AHEAD 54)
      TERM;

WF89  FREE,BLDG_89,2;
      ACTIVITY,,,WSGO;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,NNQ(12).GT.0,TERM;
      ACTIVITY;
      GOON,1;

ACTIVITY,,NNQ(3).EQ.0.AND.NNQ(4).EQ.0.AND.NNQ(5).EQ.0.AND.NN
Q(6).EQ.0,TERM;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,D_89.EQ.12,WC89;
      ACTIVITY,,D_89.EQ.18,WS89;
      ACTIVITY,,D_89.EQ.21,WL89;
      ACTIVITY,,D_89.EQ.55,WA89;

WC89  EVENT,12,1;            LOOK TO SEE IF BLDG 89 NEEDED
(LOOK 89)
      TERM;

WS89  EVENT,18,1;            LOOK TO SEE IF BLDG 89 NEEDED
(SPT_6 89)
      TERM;

WL89  EVENT,21,1;            LOOK TO SEE IF BLDG 89 NEEDED
```

```
(LNQ 89)
      TERM;

WA89  EVENT,55,1;              LOOK TO SEE IF BLDG 89 NEEDED
(AHEAD 89)
      TERM;

WSGO  GOON,1;
      ACTIVITY,,X_WASH.EQ.1,PD30;
      ACTIVITY,,X_WASH.EQ.2;
      GOON,1;
      ACTIVITY,TRIAG(1.6,2,2.6,1),,PAINT; INCLUDES C-130
PREP FOR PAINT
;
;======================================================
;         PREP FOR DePAINT
;======================================================
PREP  GOON,1;
      ACTIVITY/1,TRIAG(4.56,5.70,7.41,1),,DEPT;DePaint
;
;======================================================
;         DePAINT  (50 OR 54)
;======================================================
;
EN36  ENTER,36,1;
      ACTIVITY;
DEPT  ASSIGN,NEED=6,ARV_TIME=TNOW,MK_WT=TNOW,1;
      ACTIVITY,,D_DP.EQ.23,DP23;
      ACTIVITY,,D_DP.EQ.27,DP27;

DP23  EVENT,23,1;   BUILDING DISPATCHING (MINUDP)
      TERM;

DP27  EVENT,27,1;   BUILDING DISPATCHING (FCDP)
      TERM;

EN7   ENTER,7,1;
      ACTIVITY;
DPA7  AWAIT(10),BLDG_50,1;
      ACTIVITY;

ASSIGN,DPT_HGR=50,DP_WT=TNOW-MK_WT,SUM_WT=SUM_WT+DP_WT,1;
      ACTIVITY,,,DPTA;

EN8   ENTER,8,1;
      ACTIVITY;
DPA8  AWAIT(11),BLDG_54,1;
      ACTIVITY;

ASSIGN,DPT_HGR=54,DP_WT=TNOW-MK_WT,SUM_WT=SUM_WT+DP_WT,1;
```

```
      ACTIVITY,,,DPTA;

EN9   ENTER,9,1;
      ACTIVITY;
DPA9  AWAIT(12),BLDG_89,1;
      ACTIVITY;

ASSIGN,DPT_HGR=89,DP_WT=TNOW-MK_WT,SUM_WT=SUM_WT+DP_WT,1;
      ACTIVITY,,,DPTA;

DPTA  GOON,1;
      ACTIVITY,TRIAG(3,4,5,1),TYPE.EQ.141,FRDP;
      ACTIVITY,TRIAG(8,10,13,1),TYPE.EQ.130,FRDP;

FRDP  GOON,1;
      ACTIVITY,,DPT_HGR.EQ.54,DF54;
      ACTIVITY,,DPT_HGR.EQ.50,DF50;
      ACTIVITY,,DPT_HGR.EQ.89,DF89;

DF50  FREE,BLDG_50,2;
      ACTIVITY,,,DPGO;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,NNQ(10).GT.0,TERM;
      ACTIVITY;
      GOON,1;

ACTIVITY,,NNQ(3).EQ.0.AND.NNQ(4).EQ.0.AND.NNQ(5).EQ.0.AND.NN
Q(6).EQ.0,TERM;
      ACTIVITY;
      GOON,1
      ACTIVITY,,D_50.EQ.10,DC50;
      ACTIVITY,,D_50.EQ.16,DS50;
      ACTIVITY,,D_50.EQ.19,DL50;
      ACTIVITY,,D_50.EQ.45,DA50;

DC50  EVENT,10,1;            LOOK TO SEE IF BLDG 50 NEEDED
(LOOK 50)
      TERM;

DS50  EVENT,16,1;            LOOK TO SEE IF BLDG 50 NEEDED
(SPT 50)
      TERM;

DL50  EVENT,19,1;            LOOK TO SEE IF BLDG 50 NEEDED
(LNQ 50)
      TERM;

DA50  EVENT,45,1;            LOOK TO SEE IF BLDG 50 NEEDED
(AHEAD 50)
```

```
      TERM;

DF54  FREE,BLDG_54,2;
      ACTIVITY,,,DPGO;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,NNQ(11).GT.0,TERM;
      ACTIVITY;
      GOON,1;

ACTIVITY,,NNQ(3).EQ.0.AND.NNQ(4).EQ.0.AND.NNQ(5).EQ.0.AND.NN
Q(6).EQ.0,TERM;
      ACTIVITY;
      GOON,1
      ACTIVITY,,D_54.EQ.11,DC54;
      ACTIVITY,,D_54.EQ.17,DS54;
      ACTIVITY,,D_54.EQ.20,DL54;
      ACTIVITY,,D_54.EQ.50,DA54;

DC54  EVENT,11,1;               LOOK TO SEE IF BLDG 54 NEEDED
(LOOK 54)
      TERM;

DS54  EVENT,17,1;               LOOK TO SEE IF BLDG 54 NEEDED
(SPT 54)
      TERM;

DL54  EVENT,20,1;               LOOK TO SEE IF BLDG 54 NEEDED
(LNQ 54)
      TERM;

DA54  EVENT,50,1;               LOOK TO SEE IF BLDG 54 NEEDED
(AHEAD 54)
      TERM;

DF89  FREE,BLDG_89,2;
      ACTIVITY,,,DPGO;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,NNQ(12).GT.0,TERM;
      ACTIVITY;
      GOON,1;

ACTIVITY,,NNQ(3).EQ.0.AND.NNQ(4).EQ.0.AND.NNQ(5).EQ.0.AND.NN
Q(6).EQ.0,TERM;
      ACTIVITY;
      GOON,1
      ACTIVITY,,D_89.EQ.12,DC89;
      ACTIVITY,,D_89.EQ.18,DS89;
      ACTIVITY,,D_89.EQ.21,DL89;
```

```
      ACTIVITY,,D_89.EQ.55,DA89;

DC89  EVENT,12,1;                LOOK TO SEE IF BLDG 89 NEEDED
(LOOK 89)
      TERM;

DS89  EVENT,18,1;                LOOK TO SEE IF BLDG 89 NEEDED
(SPT 89)
      TERM;

DL89  EVENT,21,1;                LOOK TO SEE IF BLDG 89 NEEDED
(LNQ 89)
      TERM;

DA89  EVENT,55,1;                LOOK TO SEE IF BLDG 89 NEEDED
(AHEAD 89)
      TERM;

DPGO  GOON,1
      ACTIVITY,,TYPE.EQ.130,PD30;
      ACTIVITY,,TYPE.EQ.141,DPG1;
;
DPG1  GOON,1;
      ACTIVITY,,WORK.EQ.4,CWBX;
      ACTIVITY,,WORK.EQ.7,PDM;
      ACTIVITY,,WORK.EQ.2.OR.WORK.EQ.3,SPLN;


;
;======================================================
;          W/E/A
;=======================================================
;
EN35  ENTER,35,1;
      ACTIVITY;
WEA   ASSIGN,NEED=6,ARV_TIME=TNOW,MK_WT=TNOW,1;
      ACTIVITY,,D_WEA.EQ.24,DP24;
      ACTIVITY,,D_WEA.EQ.28,DP28;

DP24  EVENT,24,1;   BUILDING DISPATCHING (MINUWEA)
      TERM;

DP28  EVENT,28,1;   BUILDING DISPATCHING (FCWEA)
      TERM;

EN10  ENTER,10,1;
      ACTIVITY;
WE10  AWAIT(10),BLDG_50,1;
      ACTIVITY;
```

```
ASSIGN,WEA_HGR=50,WEA_WT=TNOW-MK_WT,SUM_WT=SUM_WT+WEA_WT,1;
      ACTIVITY,,,WEAA;

EN11  ENTER,11,1;
      ACTIVITY;
WE11  AWAIT(11),BLDG_54,1;
      ACTIVITY;

ASSIGN,WEA_HGR=54,WEA_WT=TNOW-MK_WT,SUM_WT=SUM_WT+WEA_WT,1;
      ACTIVITY,,,WEAA;

EN12  ENTER,12,1;
      ACTIVITY;
WE12  AWAIT(12),BLDG_89,1;
      ACTIVITY;

ASSIGN,WEA_HGR=89,WEA_WT=TNOW-MK_WT,SUM_WT=SUM_WT+WEA_WT,1;
      ACTIVITY,,,WEAA;

WEAA  ASSIGN,PNT_HGR=WEA_HGR,PNT_WT=0,1
      ACTIVITY/8,TRIAG(.8,1,1.3,1),,PNTA;WEA
;
;=======================================================
;            PAINT  (50 OR 89)
;=======================================================
;

PAINT ASSIGN,NEED=6,ARV_TIME=TNOW,MK_WT=TNOW,1;
      ACTIVITY,,D_PNT.EQ.25,DP25;
      ACTIVITY,,D_PNT.EQ.29,DP29;

DP25  EVENT,25,1;   BUILDING DISPATCHING (MINUPNT)
      TERM;

DP29  EVENT,29,1;   BUILDING DISPATCHING (FCPNT)
      TERM;

EN13  ENTER,13,1;
      ACTIVITY;
PE13  AWAIT(10),BLDG_50,1;
      ACTIVITY;

ASSIGN,PNT_HGR=50,PNT_WT=TNOW-MK_WT,SUM_WT=SUM_WT+PNT_WT,1;
      ACTIVITY,,,PNTA;

EN14  ENTER,14,1;
      ACTIVITY;
PE14  AWAIT(11),BLDG_54,1;
      ACTIVITY;
```

```
ASSIGN,PNT_HGR=54,PNT_WT=TNOW-MK_WT,SUM_WT=SUM_WT+PNT_WT,1;
      ACTIVITY,,,PNTA;

EN15  ENTER,15,1;
      ACTIVITY;
PE15  AWAIT(12),BLDG_89,1;
      ACTIVITY;

ASSIGN,PNT_HGR=89,PNT_WT=TNOW-MK_WT,SUM_WT=SUM_WT+PNT_WT,1;
      ACTIVITY,,,PNTA;

PNTA  GOON,1;
      ACTIVITY/9,TRIAG(3.2,4,5.2,1),TYPE.EQ.141,PTST;PAINT

ACTIVITY,TRIAG(2.4,3,3.9,1),TYPE.EQ.130.AND.WORK.EQ.10,PTST;

ACTIVITY,TRIAG(1.2,1.5,1.95,1),TYPE.EQ.130.AND.WORK.EQ.11,PT
ST;

PTST  GOON,1;
      ACTIVITY,,PNT_HGR.EQ.50,PF50;
      ACTIVITY,,PNT_HGR.EQ.54,PF54;
      ACTIVITY,,PNT_HGR.EQ.89,PF89;

PF50  FREE,BLDG_50,2;
      ACTIVITY,,,OUT;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,NNQ(10).GT.0,TERM;
      ACTIVITY;
      GOON,1;

ACTIVITY,,NNQ(3).EQ.0.AND.NNQ(4).EQ.0.AND.NNQ(5).EQ.0.AND.NN
Q(6).EQ.0,TERM;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,D_50.EQ.10,PC50;
      ACTIVITY,,D_50.EQ.16,PS50;
      ACTIVITY,,D_50.EQ.19,PL50;
      ACTIVITY,,D_50.EQ.45,PA50;

PC50  EVENT,10,1;             LOOK TO SEE IF BLDG 50 NEEDED
(LOOK 50)
      TERM;

PS50  EVENT,16,1;             LOOK TO SEE IF BLDG 50 NEEDED
(SPT 50)
      TERM;
```

```
PL50  EVENT,19,1;                LOOK TO SEE IF BLDG 50 NEEDED
(LNQ 50)
      TERM;

PA50  EVENT,45,1;                LOOK TO SEE IF BLDG 50 NEEDED
(AHEAD 50)
      TERM;

PF54  FREE,BLDG_54,2;
      ACTIVITY,,,OUT;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,NNQ(11).GT.0,TERM;

ACTIVITY,,NNQ(3).EQ.0.AND.NNQ(4).EQ.0.AND.NNQ(5).EQ.0.AND.NN
Q(6).EQ.0,TERM;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,D_54.EQ.11,PC54;
      ACTIVITY,,D_54.EQ.17,PS54;
      ACTIVITY,,D_54.EQ.20,PL54;
      ACTIVITY,,D_54.EQ.50,PA54;

PC54  EVENT,11,1;                LOOK TO SEE IF BLDG 54 NEEDED
(LOOK 54)
      TERM;

PS54  EVENT,17,1;                LOOK TO SEE IF BLDG 54 NEEDED
(SPT 54)
      TERM;

PL54  EVENT,20,1;                LOOK TO SEE IF BLDG 54 NEEDED
(LNQ 54)
      TERM;

PA54  EVENT,50,1;                LOOK TO SEE IF BLDG 54 NEEDED
(AHEAD 54)
      TERM;

PF89  FREE,BLDG_89,2;
      ACTIVITY,,,OUT;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,NNQ(12).GT.0,TERM;

ACTIVITY,,NNQ(3).EQ.0.AND.NNQ(4).EQ.0.AND.NNQ(5).EQ.0.AND.NN
Q(6).EQ.0,TERM;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,D_89.EQ.12,PC89;
```

```
       ACTIVITY,,D_89.EQ.18,PS89;
       ACTIVITY,,D_89.EQ.21,PL89;
       ACTIVITY,,D_89.EQ.55,PA89;

PC89   EVENT,12,1;             LOOK TO SEE IF BLDG 89 NEEDED
(LOOK 89)
       TERM;

PS89   EVENT,18,1;             LOOK TO SEE IF BLDG 89 NEEDED
(SPT 89)
       TERM;

PL89   EVENT,21,1;             LOOK TO SEE IF BLDG 89 NEEDED
(LNQ 89)
       TERM;

PA89   EVENT,55,1;             LOOK TO SEE IF BLDG 89 NEEDED
(AHEAD 89)
       TERM;

OUT    GOON,1;
       ACTIVITY,,TYPE.EQ.130,CLC1;
       ACTIVITY,TRIAG(.32,.4,.52,1),,FTEST;
```

Modifications for Preemption

```
;=====================================================
;          DePAINT  (50 OR 54)
;=====================================================
;
      ENTER,36,1;
      ACTIVITY;
DEPT  GOON,1;
      ACTIVITY,,TYPE.EQ.130,DEP3;
      ACTIVITY,,TYPE.EQ.141,DP41;

DEP3  ASSIGN,NEED=1,ARV_TIME=TNOW,MK_WT=TNOW,1;
      ACTIVITY,,NNRSC(5).EQ.1.AND.NNQ(10).EQ.0,DPA7;
      ACTIVITY,,,DEPE;

DP41  ASSIGN,NEED=2,ARV_TIME=TNOW,MK_WT=TNOW,1;
      ACTIVITY,,NNRSC(3).EQ.1.AND.NNQ(11).EQ.0,DPA8;
      ACTIVITY,,,DEPE;

DEPE  EVENT,7,1;                          CALL FILEM(4,ATRIB)
      TERM;

DPPT  ASSIGN,PREMPT=1,1;
      ACTIVITY,,,DPA8;

      ENTER,7,1;
      ACTIVITY;
DPA7  AWAIT(10),BLDG_50,1;
      ACTIVITY;

ASSIGN,DPT_HGR=50,DP_WT=TNOW-MK_WT,SUM_WT=SUM_WT+DP_WT,1;
      ACTIVITY,,,DPTA;

      ENTER,8,1;
      ACTIVITY;
DPA8  AWAIT(11),BLDG_54,1;
      ACTIVITY;

ASSIGN,DPT_HGR=54,DP_WT=TNOW-MK_WT,SUM_WT=SUM_WT+DP_WT,FLAG_
54=1,1;
      ACTIVITY,,,DPTA;

DPTA  GOON,1;
      ACTIVITY,,DPT_HGR.EQ.50,DP50;
      ACTIVITY,,DPT_HGR.EQ.54,DP54;

DP54  GOON,1;
      ACTIVITY,TRIAG(3,4,5,1),TYPE.EQ.141;
```

```
      ACTIVITY;
      GOON,1;
      ACTIVITY,TRIAG(.54,.8,1.04,1),PREMPT.EQ.1,FRDP;
      ACTIVITY,,,FRDP;

DP50  GOON,1;
      ACTIVITY,TRIAG(8,10,13,1),TYPE.EQ.130,FRDP;

FRDP  GOON,1;
      ACTIVITY,,DPT_HGR.EQ.54,DF54;
      ACTIVITY,,DPT_HGR.EQ.50,DF50;

DF54  FREE,BLDG_54,1;
      ACTIVITY;
      ASSIGN,FLAG_54=0,2;
      ACTIVITY,,,DPGO;
      ACTIVITY;
      GOON,1;
      ACTIVITY,,NNQ(11).GT.0,TERM;
      ACTIVITY;
      GOON,1;

ACTIVITY,,NNQ(3).EQ.0.AND.NNQ(4).EQ.0.AND.NNQ(5).EQ.0,TERM;
      ACTIVITY;
DFREE GOON,1
      ACTIVITY,,D_54.EQ.11,DC54;
      ACTIVITY,,D_54.EQ.14,DS54;
      ACTIVITY,,D_54.EQ.20,DL54;
      ACTIVITY,,D_54.EQ.47,DA54;


DC54  EVENT,11,1;             LOOK TO SEE IF BLDG 54 NEEDED
(LOOK 54)
      TERM;

DS54  EVENT,14,1;             LOOK TO SEE IF BLDG 54 NEEDED
(SPT 54)
      TERM;

DL54  EVENT,20,1;             LOOK TO SEE IF BLDG 54 NEEDED
(LNQ 54)
      TERM;

DA54  EVENT,47,1;             LOOK TO SEE IF BLDG 54 NEEDED
(AHEAD 54)
      TERM;

DF50  FREE,BLDG_50,2;
      ACTIVITY,,,DPGO;
      ACTIVITY;
```

```
      GOON,1;
      ACTIVITY,,D_50.EQ.10,DC50;
      ACTIVITY,,D_50.EQ.13,DS50;
      ACTIVITY,,D_50.EQ.19,DC50;
      ACTIVITY,,D_50.EQ.42,DC50;

DC50  EVENT,10,1;              LOOK TO SEE IF BLDG 50 NEEDED
(LOOK 50)
      TERM;

DS50  EVENT,13,1;              LOOK TO SEE IF BLDG 50 NEEDED
(SPT 50)
      TERM;

DL50  EVENT,19,1;              LOOK TO SEE IF BLDG 50 NEEDED
(LNQ 50)
      TERM;

DA50  EVENT,42,1;              LOOK TO SEE IF BLDG 50 NEEDED
(AHEAD 50)
      TERM;

DPGO  GOON,1
      ACTIVITY,,TYPE.EQ.130,PD30;
      ACTIVITY,,TYPE.EQ.141,DPG1;
;
DPG1  GOON,1;
      ACTIVITY,,WORK.EQ.4,CWBX;
      ACTIVITY,,WORK.EQ.7,PDM;
      ACTIVITY,,WORK.EQ.2.OR.WORK.EQ.3,SPLN;


;
;=======================================================
;          W/E/A
;========================================================
;
      ENTER,35,1;
      ACTIVITY;
WEA   GOON,1;
      ACTIVITY,,TYPE.EQ.130,WE30;
      ACTIVITY,,TYPE.EQ.141,WE41;

WE30  ASSIGN,NEED=1,ARV_TIME=TNOW,MK_WT=TNOW,1;
      ACTIVITY,,NNRSC(5).EQ.1.AND.NNQ(10).EQ.0,WE10;  IF 50
BUSY
      ACTIVITY,,,WEEV;                                FILE
ENTITY (5)

WE41  ASSIGN,NEED=2,ARV_TIME=TNOW,MK_WT=TNOW,1;
```

```
      ACTIVITY,,NNRSC(3).EQ.1.AND.NNQ(11).EQ.0,WE11;  IF 54
BUSY
      ACTIVITY,,NRUSE(4).EQ.1.OR.FLAG_54.EQ.2,WEEV
      ACTIVITY;
      PREEMPT(7),BLDG_54,DPPT,,1;
      ACTIVITY/29;

ASSIGN,WEA_HGR=54,WEA_WT=TNOW-MK_WT,SUM_WT=SUM_WT+WEA_WT,FLA
G_54=2,1;
      ACTIVITY,,,WEAA;

WEEV  EVENT,8,1;                         CALL FILEM(5,ATRIB)
      TERM;

      ENTER,10,1;
      ACTIVITY;
WE10  AWAIT(10),BLDG_50,1;
      ACTIVITY;

ASSIGN,WEA_HGR=50,WEA_WT=TNOW-MK_WT,SUM_WT=SUM_WT+WEA_WT,1;
      ACTIVITY,,,WEAA;

      ENTER,11,1;
      ACTIVITY;
WE11  AWAIT(11),BLDG_54,,1;
      ACTIVITY;

ASSIGN,WEA_HGR=54,WEA_WT=TNOW-MK_WT,SUM_WT=SUM_WT+WEA_WT,1;
      ACTIVITY,,,WEAA;

WEAA  GOON,1;
      ACTIVITY/8,TRIAG(.8,1,1.3,1);WEA
      GOON,1;
      ACTIVITY,,WEA_HGR.EQ.54,WEF54;
      ACTIVITY,,WEA_HGR.EQ.50;
      ASSIGN,PNT_HGR=50,PNT_WT=0,1;
      ACTIVITY,,,PNTA;

WEF54 FREE,BLDG_54,1;
      ACTIVITY;
      ASSIGN,FLAG_54=0,2;
      ACTIVITY,,,WEFE;
      ACTIVITY,,,WEFF;

WEFE  ASSIGN,NEED=3,MK_WT=TNOW,1;        NEED FOR PAINT
      ACTIVITY,,,PE15;

WEFF  GOON,1;
      ACTIVITY,,NNQ(11).GT.0,TERM;
      ACTIVITY;
```

```
      GOON,1;

ACTIVITY,,NNQ(3).EQ.0.AND.NNQ(4).EQ.0.AND.NNQ(5).EQ.0,TERM;
      ACTIVITY;
AFREE GOON,1;
      ACTIVITY,,D_54.EQ.11,EC54;
      ACTIVITY,,D_54.EQ.14,ES54;
      ACTIVITY,,D_54.EQ.20,EL54;
      ACTIVITY,,D_54.EQ.47,EA54;

EC54  EVENT,11,1;            LOOK TO SEE IF BLDG 54 NEEDED
(LOOK 54)
      TERM;

ES54  EVENT,14,1;            LOOK TO SEE IF BLDG 54 NEEDED
(SPT 54)
      TERM;

EL54  EVENT,20,1;            LOOK TO SEE IF BLDG 54 NEEDED
(LNQ 54)
      TERM;

EA54  EVENT,47,1;            LOOK TO SEE IF BLDG 54 NEEDED
(AHEAD 54)
      TERM;
```

Appendix F. FORTRAN Source Code

Due to some complex coding required for this research, FORTRAN inserts were required to model areas for which SLAM II coding was not possible. This Appendix provides this FORTRAN Source code

```
      PROGRAM MAIN
      DIMENSION NSET(900000)
      COMMON/SCOM1/ATRIB(100),DD(100),DDL(100),DTNOW,II,MFA,MSTOP,NCLNR
     1,NCRDR,NPRNT,NNRUN,NNSET,NTAPE,SS(100),SSL(100),TNEXT,TNOW,XX(100)
      COMMON QSET(5000)
      EQUIVALENCE(NSET(1),QSET(1))
      NNSET=500000
      NCRDR=5
      NPRNT=6
      NTAPE=7
      OPEN(UNIT=1,FILE='WTE.EXP',STATUS='NEW')
      OPEN(UNIT=2,FILE='TIS.EXP',STATUS='NEW')
      OPEN(UNIT=3,FILE='UTL.EXP',STATUS='NEW')
      OPEN(UNIT=4,FILE='MAX.EXP',STATUS='NEW')
      OPEN(UNIT=8,FILE='CNT.EXP',STATUS='NEW')
      OPEN(UNIT=9,FILE='TWT.EXP',STATUS='NEW')
      CALL SLAM
      WRITE(1,*)
      WRITE(2,*)
      WRITE(3,*)
      WRITE(4,*)
      WRITE(8,*)
      WRITE(9,*)
      CLOSE(1)
      CLOSE(2)
      CLOSE(3)
      CLOSE(4)
      CLOSE(8)
      CLOSE(9)
      STOP
      END
C
C********************************************
C THE FOLLOWING INTLC SUBROUTINE
C********************************************
C
      SUBROUTINE INTLC
      COMMON/SCOM1/ATRIB(100),DD(100),DDL(100),DTNOW,II,MFA,MSTOP,NCLNR
     1,NCRDR,NPRNT,NNRUN,NNSET,NTAPE,SS(100),SSL(100),TNEXT,TNOW,XX(100)
      XX(1)=0
      XX(2)=0
      XX(3)=0
      RETURN
      END
C
C THE FOLLOWING IS SUBROUTINE EVENT
C
      SUBROUTINE EVENT(I)
      COMMON/SCOM1/ATRIB(100),DD(100),DDL(100),DTNOW,II,MFA,MSTOP,NCLNR
     1,NCRDR,NPRNT,NNRUN,NNSET,NTAPE,SS(100),SSL(100),TNEXT,TNOW,XX(100)
```

```
      EQUIVALENCE(ATRIB(3),WORK)
      EQUIVALENCE(ATRIB(2),WARM), (ATRIB(15),NEED), (ATRIB(16),ARV_TIME)
      GO TO (1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20
     2,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40
     3,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57),I
1     CALL ENTER(1,ATRIB)
      RETURN
2     REWIND(1)
      RETURN
3     CALL ENTER(2,ATRIB)
      RETURN
4     CALL ENTER(3,ATRIB)
      RETURN
5     CALL CLEAR
      RETURN
6     CALL FILEM(3,ATRIB)
      RETURN
7     CALL FILEM(4,ATRIB)
      RETURN
8     CALL FILEM(5,ATRIB)
      RETURN
9     CALL FILEM(6,ATRIB)
      RETURN
10    CALL LOOK50
      RETURN
11    CALL LOOK54
      RETURN
12    CALL LOOK89
      RETURN
13    CALL SPT50
      RETURN
14    CALL SPT54
      RETURN
15    CALL SPT89
      RETURN
16    CALL SPT50_6
      RETURN
17    CALL SPT54_6
      RETURN
18    CALL SPT89_6
      RETURN
19    CALL LNQ(50)
      RETURN
20    CALL LNQ(54)
      RETURN
21    CALL LNQ(89)
      RETURN
22    CALL MINUWASH
      RETURN
23    CALL MINUDP
```

```
      RETURN
24    CALL MINUWEA
      RETURN
25    CALL MINUPAINT
      RETURN
26    CALL FCWASH
      RETURN
27    CALL FCDP
      RETURN
28    CALL FCWEA
      RETURN
29    CALL FCPAINT
      RETURN
30    CALL ENTER(30,ATRIB)
      RETURN
31    CALL ENTER(30,ATRIB)
      RETURN
32    CALL ENTER(32,ATRIB)
      RETURN
33    CALL ENTER(33,ATRIB)
      RETURN
34    CALL ENTER(34,ATRIB)
      RETURN
35    CALL ENTER(35,ATRIB)
      RETURN
36    CALL ENTER(36,ATRIB)
      RETURN
37    CALL ENTER(37,ATRIB)
      RETURN
38    CALL ENTER(38,ATRIB)
      RETURN
39    CALL ENTER(39,ATRIB)
      RETURN
40    CALL ENTER(40,ATRIB)
      RETURN
41    CALL AHEAD(50,1)
      RETURN
42    CALL AHEAD(50,2)
      RETURN
43    CALL AHEAD(50,3)
      RETURN
44    CALL AHEAD(50,5)
      RETURN
45    CALL AHEAD(50,6)
      RETURN
46    CALL AHEAD(54,1)
      RETURN
47    CALL AHEAD(54,2)
      RETURN
48    CALL AHEAD(54,3)
```

```
      RETURN
49    CALL AHEAD(54,5)
      RETURN
50    CALL AHEAD(54,6)
      RETURN
51    CALL AHEAD(89,1)
      RETURN
52    CALL AHEAD(89,2)
      RETURN
53    CALL AHEAD(89,3)
      RETURN
54    CALL AHEAD(89,5)
      RETURN
55    CALL AHEAD(89,6)
      RETURN
56    CALL WEA_5_FC
      RETURN
57    CALL WEA_5_MINU
      RETURN
      END
C
C*********************************************
C THE FOLLOWING IS THE LOOK50 SUBROUTINE
C
C-----------
C    This subroutine is used after Bldg 50 has been freed under FCFS
C  dispatching rules.  The subroutine searched each file to find an
C  aircraft needing its usage, which has been waiting the longest.
C
C*********************************************
C
      SUBROUTINE LOOK50
      DIMENSION A(100), B(100)
      INTEGER NEXT, POINT
      COMMON/SCOM1/ATRIB(100),DD(100),DDL(100),DTNOW,II,MFA,MSTOP,NCLNR
     1,NCRDR,NPRNT,NNRUN,NNSET,NTAPE,SS(100),SSL(100),TNEXT,TNOW,XX(100)
      EQUIVALENCE(ATRIB(3),WORK)
      EQUIVALENCE(ATRIB(2),WARM)
      EQUIVALENCE(A(15),NEED)
      EQUIVALENCE(A(16),ARIVE)
C
      RANK50 = 0
      LGWT50 = 9999
      FILE50 = 0
      POINT = 0
C
C-------------------------
C   CHECK FILE 3 (Wash)
C-------------------------
C
```

```
      NEXT3=MMFE(3)
1     IF (NEXT3.EQ.0)GOTO 6
      CALL COPY(-NEXT3,3,A)
      IF (A(15).EQ.2.OR.A(15).EQ.3.OR.A(15).EQ.7)GOTO 5
      IF (A(16).GT.LGWT50)GOTO 5
      LGWT50=A(16)
      FILE50=3
      POINT=NEXT3
5     IF (NSUCR(NEXT3).EQ.0)GOTO 6
      NEXT3=NSUCR(NEXT3)
      GOTO 1
C
C=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-
C   CHECK FILE 4 (DePaint)
C=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-
C
6     NEXT4=MMFE(4)
7     IF (NEXT4.EQ.0)GOTO 11
      CALL COPY(-NEXT4,4,A)
      IF (A(15).EQ.2.OR.A(15).EQ.3.OR.A(15).EQ.7)GOTO 10
      IF (A(16).GT.LGWT50)GOTO 10
      LGWT50=A(16)
      FILE50=4
      POINT=NEXT4
10    IF (NSUCR(NEXT4).EQ.0)GOTO 11
      NEXT4=NSUCR(NEXT4)
      GOTO 7
C
C=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-
C   CHECK FILE 5 (W/E/A)
C=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-
C
11    NEXT5=MMFE(5)
12    IF (NEXT5.EQ.0)GOTO 16
      CALL COPY(-NEXT5,5,A)
      IF ((A(15).EQ.2).OR.(A(15).EQ.3).OR.(A(15).EQ.7))GOTO 15
      IF (A(16).GT.LGWT50)GOTO 15
      LGWT50=A(16)
      FILE50=5
      POINT=NEXT5
15    IF (NSUCR(NEXT5).EQ.0)GOTO 16
      NEXT5=NSUCR(NEXT5)
      GOTO 12
C
C=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-
C   CHECK FILE 6 (Paint)
C=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-
C
16    NEXT6=MMFE(6)
17    IF (NEXT6.EQ.0)GOTO 21
```

```
      CALL COPY(-NEXT6,6,A)
      IF ((A(15).EQ.2).OR.(A(15).EQ.3).OR.(A(15).EQ.7))GOTO 20
      IF (A(16).GT.LGWT50)GOTO 20
      LGWT50=A(16)
      FILE50=6
      POINT=NEXT6
20    IF (NSUCR(NEXT6).EQ.0)GOTO 21
      NEXT6=NSUCR(NEXT6)
      GOTO 17
21    IF (POINT.EQ.0)GOTO 99
      IF (FILE50.LT.6)GOTO 25
      CALL RMOVE(-POINT,6,ATRIB)
      CALL ENTER(13,ATRIB)
      GOTO 99
25    IF (FILE50.LT.5)GOTO 26
      CALL RMOVE(-POINT,5,ATRIB)
      CALL ENTER(10,ATRIB)
      GOTO 99
26    IF (FILE50.LT.4)GOTO 27
      CALL RMOVE(-POINT,4,ATRIB)
      CALL ENTER(7,ATRIB)
      GOTO 99
27    CALL RMOVE(-POINT,3,ATRIB)
      CALL ENTER(4,ATRIB)
99    RETURN
      END
C
C************************************************
C THE FOLLOWING IS THE LOOK54 SUBROUTINE
C
C-----------
C    This subroutine is used after Bldg 54 has been freed under FCFS
C  dispatching rules.  The subroutine searched each file to find an
C  aircraft needing its usage, which has been waiting the longest.
C
C************************************************
C
      SUBROUTINE LOOK54
      DIMENSION A(100), B(100)
      INTEGER NEXT, POINT
      COMMON/SCOM1/ATRIB(100),DD(100),DDL(100),DTNOW,II,MFA,MSTOP,NCLNR
     1,NCRDR,NPRNT,NNRUN,NNSET,NTAPE,SS(100),SSL(100),TNEXT,TNOW,XX(100)
      EQUIVALENCE(ATRIB(3),WORK)
      EQUIVALENCE(ATRIB(2),WARM)
      EQUIVALENCE(A(15),NEED)
      EQUIVALENCE(A(16),ARIVE)
C
      RANK54 = 0
      LGWT54 = 5000
      FILE54 = 0
```

```
      POINT = 0
C
C=========================
C   CHECK FILE 3 (Wash)
C=========================
C
      NEXT3=MMFE(3)
1     IF (NEXT3.EQ.0)GOTO 6
      CALL COPY(-NEXT3,3,A)
      IF (A(15).EQ.1.OR.A(15).EQ.3.OR.A(15).EQ.5)GOTO 5
      IF (A(16).GT.LGWT54)GOTO 5
      LGWT54=A(16)
      FILE54=3
      POINT=NEXT3
5     IF (NSUCR(NEXT3).EQ.0)GOTO 6
      NEXT3=NSUCR(NEXT3)
      GOTO 1
C
C=========================
C   CHECK FILE 4 (DePaint)
C=========================
C
6     NEXT4=MMFE(4)
7     IF (NEXT4.EQ.0)GOTO 11
      CALL COPY(-NEXT4,4,A)
      IF (A(15).EQ.1.OR.A(15).EQ.3.OR.A(15).EQ.5)GOTO 10
      IF (A(16).GT.LGWT54)GOTO 10
      LGWT54=A(16)
      FILE54=4
      POINT=NEXT4
10    IF (NSUCR(NEXT4).EQ.0)GOTO 11
      NEXT4=NSUCR(NEXT4)
      GOTO 7
C
C=========================
C   CHECK FILE 5 (W/E/A)
C=========================
C
11    NEXT5=MMFE(5)
12    IF (NEXT5.EQ.0)GOTO 16
      CALL COPY(-NEXT5,5,A)
      IF (A(15).EQ.1.OR.A(15).EQ.3.OR.A(15).EQ.5)GOTO 15
      IF (A(16).GT.LGWT54)GOTO 15
      LGWT54=A(16)
      FILE54=5
      POINT=NEXT5
15    IF (NSUCR(NEXT5).EQ.0)GOTO 16
      NEXT5=NSUCR(NEXT5)
      GOTO 12
C
```

```
C------------------------
C   CHECK FILE 6 (Paint)
C------------------------
C
16     NEXT6=MMFE(6)
17     IF (NEXT6.EQ.0)GOTO 21
       CALL COPY(-NEXT6,6,A)
       IF (A(15).EQ.1.OR.A(15).EQ.3.OR.A(15).EQ.5)GOTO 20
       IF (A(16).GT.LGWT54)GOTO 20
       LGWT54=A(16)
       FILE54=6
       POINT=NEXT6
20     IF (NSUCR(NEXT6).EQ.0)GOTO 21
       NEXT6=NSUCR(NEXT6)
       GOTO 17
21     IF (POINT.EQ.0)GOTO 99
       IF (FILE54.LT.6)GOTO 25
       CALL RMOVE(-POINT,6,ATRIB)
       CALL ENTER(14,ATRIB)
       GOTO 99
25     IF (FILE54.LT.5)GOTO 26
       CALL RMOVE(-POINT,5,ATRIB)
       CALL ENTER(11,ATRIB)
       GOTO 99
26     IF (FILE54.LT.4)GOTO 27
       CALL RMOVE(-POINT,4,ATRIB)
       CALL ENTER(8,ATRIB)
       GOTO 99
27     CALL RMOVE(-POINT,3,ATRIB)
       CALL ENTER(5,ATRIB)
99     RETURN
       END
C
C*******************************************
C
C THE FOLLOWING IS THE LOOK89 SUBROUTINE
C
C---------
C    This subroutine is used after Bldg 89 has been freed under FCFS
C  dispatching rules.  The subroutine searched each file to find an
C  aircraft needing its usage, which has been waiting the longest.
C
C*******************************************
C
       SUBROUTINE LOOK89
       DIMENSION A(100), B(100)
       INTEGER NEXT, POINT
       COMMON/SCOM1/ATRIB(100),DD(100),DDL(100),DTNOW,II,MFA,MSTOP,NCLNR
      1,NCRDR,NPRNT,NNRUN,NNSET,NTAPE,SS(100),SSL(100),TNEXT,TNOW,XX(100)
       EQUIVALENCE(ATRIB(3),WORK)
```

```
      EQUIVALENCE(ATRIB(2),WARM)
      EQUIVALENCE(A(15),NEED)
      EQUIVALENCE(A(16),ARIVE)
C
      LGWT89 = 9999
      FILE89 = 0
      POINT=0
C
C-------------------------
C   CHECK FILE 3  (Wash)
C-------------------------
C
      NEXT3=MMFE(3)
1     IF (NEXT3.EQ.0)GOTO 6
      CALL COPY(-NEXT3,3,A)
      IF ((A(15).EQ.1).OR.(A(15).EQ.2).OR.(A(15).EQ.4))GOTO 5
      IF (A(16).GT.LGWT89)GOTO 6
      LGWT89=A(16)
      FILE89=3
      POINT=NEXT3
5     IF (NSUCR(NEXT3).EQ.0)GOTO 6
      NEXT3=NSUCR(NEXT3)
      GOTO 1
C
C-------------------------
C   CHECK FILE 4 (DePaint)
C-------------------------
C
6     NEXT4=MMFE(4)
7     IF (NEXT4.EQ.0)GOTO 11
      CALL COPY(-NEXT4,4,A)
      IF ((A(15).NE.3).AND.(A(15).NE.5))GOTO 10
      IF (A(16).GT.LGWT89)GOTO 11
      LGWT89=A(16)
      FILE89=4
      POINT=NEXT4
10    IF (NSUCR(NEXT4).EQ.0)GOTO 11
      NEXT4=NSUCR(NEXT4)
      GOTO 7
C
C-------------------------
C   CHECK FILE 5 (W/E/A)
C-------------------------
C
11    NEXT5=MMFE(5)
12    IF (NEXT5.EQ.0)GOTO 16
      CALL COPY(-NEXT5,5,A)
      IF ((A(15).EQ.1).OR.(A(15).EQ.2).OR.(A(15).EQ.4))GOTO 15
      IF (A(16).GT.LGWT89)GOTO 16
      LGWT89=A(16)
```

```
      FILE89=5
      POINT=NEXT5
15    IF (NSUCR(NEXT5).EQ.0)GOTO 16
      NEXT5=NSUCR(NEXT5)
      GOTO 12
C
C========================
C   CHECK FILE 6 (Paint)
C========================
C
16    NEXT6=MMFE(6)
17    IF (NEXT6.EQ.0)GOTO 21
      CALL COPY(-NEXT6,6,A)
      IF ((A(15).EQ.1).OR.(A(15).EQ.2).OR.(A(15).EQ.4))GOTO 20
      IF (A(16).GT.LGWT89)GOTO 21
      LGWT89=A(16)
      FILE89=6
      POINT=NEXT6
20    IF (NSUCR(NEXT6).EQ.0)GOTO 21
      NEXT6=NSUCR(NEXT6)
      GOTO 17
21    IF (POINT.EQ.0)GOTO 99
      IF (FILE89.LT.6)GOTO 25
      CALL RMOVE(-POINT,6,ATRIB)
      CALL ENTER(15,ATRIB)
      GOTO 99
25    IF (FILE89.LT.5)GOTO 26
      CALL RMOVE(-POINT,5,ATRIB)
      CALL ENTER(12,ATRIB)
      GOTO 99
26    IF (FILE89.LT.4)GOTO 27
      CALL RMOVE(-POINT,4,ATRIB)
      CALL ENTER(9,ATRIB)
      GOTO 99
27    CALL RMOVE(-POINT,3,ATRIB)
      CALL ENTER(6,ATRIB)
99    RETURN
      END
C
C****************************************
C
C   THIS IS SUBROUTINE SPT50
C
C-----------
C    This subroutine is used after Bldg 50 has been freed under SPT
C  dispatching rules.  The subroutine searches each file from
C  smallest to largest expected processing times
C
C   The order searched for Bldg 50 is as follows:
C
```

```
C     1) C-130 Wash  2) W/E/A C-141  3) Wash & SS C-130
C     3) Paint Scuff Sanded C-130  4) Paint SS C-130
C     5) W/E/A & Paint Sndrd C-130  6) Depaint C-130
C      Assumption:  Bldg 50 will not DePaint a C-141 ac
C
C************************************
C
      SUBROUTINE SPT50
      DIMENSION A(100), B(100)
      COMMON/SCOM1/ATRIB(100),DD(100),DDL(100),DTNOW,II,MFA,MSTOP,NCLNR
     1,NCRDR,NPRNT,NNRUN,NNSET,NTAPE,SS(100),SSL(100),TNEXT,TNOW,XX(100)
      EQUIVALENCE(ATRIB(3),WORK)
      EQUIVALENCE(ATRIB(2),WARM)
      EQUIVALENCE(A(15),NEED)
      EQUIVALENCE(A(16),ARIVE)

C
C=============================
C   (1) CHECK IF C-130 AWAITING INCOMING WASH
C=============================
C
      NEXT=MMFE(3)
1     IF (NEXT.EQ.0)GOTO 6
      CALL COPY(-NEXT,3,A)
      IF (A(15).EQ.2.OR.A(15).EQ.3.OR.A(15).EQ.7)GOTO 5
      IF (A(14).GT.1)GOTO 5
      CALL RMOVE(-NEXT,3,ATRIB)
      CALL ENTER(4,ATRIB)
      GOTO 99
5     IF (NSUCR(NEXT).EQ.0)GOTO 6
      NEXT=NSUCR(NEXT)
      GOTO 1
C
C=============================
C   (2) CHECK FOR W/E/A C-141 AIRCRAFT
C=============================
C
6     NEXT=MMFE(5)
7     IF (NEXT.EQ.0)GOTO 11
      CALL COPY(-NEXT,5,A)
      IF (A(15).EQ.2.OR.A(15).EQ.3.OR.A(15).EQ.7)GOTO 10
      IF (A(5).NE.141)GOTO 10
      CALL RMOVE(-NEXT,5,ATRIB)
      CALL ENTER(10,ATRIB)
      GOTO 99
10    IF (NSUCR(NEXT).EQ.0)GOTO 11
      NEXT=NSUCR(NEXT)
      GOTO 7
C
C=============================
```

```
C   (3) CHECK IF C-130 AWAITING OUTGOING WASH & SCUFF SAND
C-------------------------------------------
C
11     NEXT=MMFE(3)
12     IF (NEXT.EQ.0)GOTO 16
       CALL COPY(-NEXT,3,A)
       IF (A(15).EQ.2.OR.A(15).EQ.3.OR.A(15).EQ.7)GOTO 15
       IF (A(14).LT.1)GOTO 15
       CALL RMOVE(-NEXT,3,ATRIB)
       CALL ENTER(4,ATRIB)
       GOTO 99
15     IF (NSUCR(NEXT).EQ.0)GOTO 16
       NEXT=NSUCR(NEXT)
       GOTO 12
C
C-------------------------------------------
C   (4) CHECK FOR A PAINT TYPE = 11
C-------------------------------------------
C
16     NEXT=MMFE(6)
17     IF (NEXT.EQ.0)GOTO 21
       CALL COPY(-NEXT,6,A)
       IF ((A(15).EQ.2).OR.(A(15).EQ.3).OR.(A(15).EQ.7))GOTO 20
       IF (A(3).NE.11)GOTO 20
       CALL RMOVE(-NEXT,6,ATRIB)
       CALL ENTER(13,ATRIB)
       GOTO 99
20     IF (NSUCR(NEXT).EQ.0)GOTO 21
       NEXT=NSUCR(NEXT)
       GOTO 17
C
C-------------------------------------------
C   (3) CHECK FOR W/E/A & PAINT TYPE = 10
C-------------------------------------------
C
21     NEXT=MMFE(5)
22     IF (NEXT.EQ.0)GOTO 26
       CALL COPY(-NEXT,5,A)
       IF ((A(15).EQ.2).OR.(A(15).EQ.3).OR.(A(15).EQ.7))GOTO 25
       IF (A(3).NE.10)GOTO 25
       CALL RMOVE(-NEXT,5,ATRIB)
       CALL ENTER(10,ATRIB)
       GOTO 99
25     IF (NSUCR(NEXT).EQ.0)GOTO 26
       NEXT=NSUCR(NEXT)
       GOTO 22
C
C-------------------------------------------
C   (6) CHECK FOR A DePAINT C-130
C-------------------------------------------
```

```
C
26     NEXT=MMFE(4)
27     IF (NEXT.EQ.0)GOTO 99
       CALL COPY(-NEXT,4,A)
       IF ((A(15).EQ.2).OR.(A(15).EQ.3).OR.(A(15).EQ.7))GOTO 30
       IF (A(5).NE.130)GOTO 30
       CALL RMOVE(-NEXT,4,ATRIB)
       CALL ENTER(7,ATRIB)
       GOTO 99
30     IF (NSUCR(NEXT).EQ.0)GOTO 99
       NEXT=NSUCR(NEXT)
       GOTO 27
99     RETURN
       END
C
C***************************************
C
C   THIS IS SUBROUTINE SPT54
C
C-----------
C    This subroutine is used after Bldg 54 has been freed under SPT
C  dispatching rules.  The subroutine searches each file from
C  smallest to largest expected processing times
C
C   The order searched for Bldg 54 is as follows:
C
C    1) C-130 Incoming Wash  2) W/E/A aircraft  3) Outgoing Wash & SS
C-130
C    4) Paint Scuff Sanded C-130  5) DePaint C-130
C    6) DePaint C-141
C
C***************************************
C
       SUBROUTINE SPT54
       DIMENSION A(100), B(100)
       COMMON/SCOM1/ATRIB(100),DD(100),DDL(100),DTNOW,II,MFA,MSTOP,NCLNR
      1,NCRDR,NPRNT,NNRUN,NNSET,NTAPE,SS(100),SSL(100),TNEXT,TNOW,XX(100)
       EQUIVALENCE(ATRIB(3),WORK)
       EQUIVALENCE(ATRIB(2),WARM)
       EQUIVALENCE(A(15),NEED)
       EQUIVALENCE(A(16),ARIVE)
C
C-------------------------------
C   (1) CHECK IF C-130 AWAITING INCOMING WASH
C-------------------------------
C
       NEXT=MMFE(3)
1      IF (NEXT.EQ.0)GOTO 6
       CALL COPY(-NEXT,3,A)
       IF (A(15).EQ.1.OR.A(15).EQ.3.OR.A(15).EQ.5)GOTO 5
```

```
      IF (A(14).GE.1)GOTO 5
      CALL RMOVE(-NEXT,3,ATRIB)
      CALL ENTER(5,ATRIB)
      GOTO 99
5     IF (NSUCR(NEXT).EQ.0)GOTO 6
      NEXT=NSUCR(NEXT)
      GOTO 1
C
C-----------------------------------------
C   (2) CHECK FOR W/E/A AIRCRAFT
C-----------------------------------------
C
6     NEXT=MMFE(5)
7     IF (NEXT.EQ.0)GOTO 11
      CALL COPY(-NEXT,5,A)
      IF (A(15).EQ.1.OR.A(15).EQ.3.OR.A(15).EQ.5)GOTO 10
      CALL RMOVE(-NEXT,5,ATRIB)
      CALL ENTER(11,ATRIB)
      GOTO 99
10    IF (NSUCR(NEXT).EQ.0)GOTO 11
      NEXT=NSUCR(NEXT)
      GOTO 7
C
C-----------------------------------------
C   (3) CHECK IF C-130 AWAITING OUTGOING WASH & SCUFF SAND
C-----------------------------------------
C
11    NEXT=MMFE(3)
12    IF (NEXT.EQ.0)GOTO 16
      CALL COPY(-NEXT,3,A)
      IF (A(15).EQ.1.OR.A(15).EQ.3.OR.A(15).EQ.5)GOTO 15
      IF (A(14).LT.1)GOTO 15
      CALL RMOVE(-NEXT,3,ATRIB)
      CALL ENTER(5,ATRIB)
      GOTO 99
15    IF (NSUCR(NEXT).EQ.0)GOTO 16
      NEXT=NSUCR(NEXT)
      GOTO 12
C
C-----------------------------------------
C   (4) CHECK FOR A PAINT TYPE - 11
C-----------------------------------------
C
16    NEXT=MMFE(6)
17    IF (NEXT.EQ.0)GOTO 21
      CALL COPY(-NEXT,6,A)
      IF ((A(15).EQ.1).OR.(A(15).EQ.3).OR.(A(15).EQ.5))GOTO 20
      IF (A(3).NE.11)GOTO 20
      CALL RMOVE(-NEXT,6,ATRIB)
      CALL ENTER(14,ATRIB)
```

```
      GOTO 99
20    IF (NSUCR(NEXT).EQ.0)GOTO 21
      NEXT=NSUCR(NEXT)
      GOTO 17
C
C------------------------------
C   (5) CHECK FOR A DePAINT C-130 (CHEMICAL)
C------------------------------
C
21    NEXT=MMFE(4)
22    IF (NEXT.EQ.0)GOTO 26
      CALL COPY(-NEXT,4,A)
      IF ((A(15).EQ.1).OR.(A(15).EQ.3).OR.(A(15).EQ.5))GOTO 25
      IF (A(5).NE.130)GOTO 25
      CALL RMOVE(-NEXT,4,ATRIB)
      CALL ENTER(8,ATRIB)
      GOTO 99
25    IF (NSUCR(NEXT).EQ.0)GOTO 26
      NEXT=NSUCR(NEXT)
      GOTO 22
C
C------------------------------
C   (6) CHECK FOR A DePAINT C-141
C------------------------------
C
26    NEXT=MMFE(4)
27    IF (NEXT.EQ.0)GOTO 99
      CALL COPY(-NEXT,4,A)
      IF ((A(15).EQ.1).OR.(A(15).EQ.3).OR.(A(15).EQ.5))GOTO 30
      IF (A(5).NE.141)GOTO 30
      CALL RMOVE(-NEXT,4,ATRIB)
      CALL ENTER(8,ATRIB)
      GOTO 99
30    IF (NSUCR(NEXT).EQ.0)GOTO 99
      NEXT=NSUCR(NEXT)
      GOTO 27
99    RETURN
      END
C
C**************************************
C
C   THIS IS SUBROUTINE SPT89
C
C-----------
C    This subroutine is used after Bldg 89 has been freed under SPT
C  dispatching rules.  The subroutine searches each file from
C  smallest to largest expected processing times
C
C   The order searched for Bldg 54 is as follows:
C
```

```
C    1) C-130 Incoming Wash  2) W/E/A aircraft  3) Outgoing Wash & SS
C-130
C    4) Paint Scuff Sanded C-130  5) DePaint C-130
C    6) DePaint C-141
C
C****************************************
C
      SUBROUTINE SPT89
      DIMENSION A(100), B(100)
      INTEGER NEXT
      COMMON/SCOM1/ATRIB(100),DD(100),DDL(100),DTNOW,II,MFA,MSTOP,NCLNR
     1,NCRDR,NPRNT,NNRUN,NNSET,NTAPE,SS(100),SSL(100),TNEXT,TNOW,XX(100)
      EQUIVALENCE(ATRIB(3),WORK)
      EQUIVALENCE(ATRIB(2),WARM)
      EQUIVALENCE(A(15),NEED)
      EQUIVALENCE(A(16),ARIVE)
C
C==============================
C   CHECK FOR A PAINT TYPE = 11 (SS C-130)
C==============================
C
      NEXT=MMFE(6)
17    IF (NEXT.EQ.0)GOTO 99
      CALL COPY(-NEXT,6,A)
      IF ((A(15).EQ.1).OR.(A(15).EQ.2).OR.(A(15).EQ.4))GOTO 20
      CALL RMOVE(-NEXT,6,ATRIB)
      CALL ENTER(15,ATRIB)
      GOTO 99
20    IF (NSUCR(NEXT).EQ.0)GOTO 99
      NEXT=NSUCR(NEXT)
      GOTO 17
99    RETURN
      END
C
C***********************************
C
C   THIS IS SUBROUTINE SPT50_6
C
C-----------
C    This subroutine is used after Bldg 50 has been freed under SPT
C  dispatching rules IN CONFIGURATION OPTION #6.  The subroutine
C  searches each file from smallest to largest expected processing times
C
C   The order searched for Bldg 50 is as follows:
C
C    1) C-130 INCOMING Wash  2) Outgoing Wash & SS C-130
C    3) Paint C-130 SS AC  4) DePaint C-141 AC
C    5) W/E/A & Paint Stdrd C-130 ac  6)  W/E/A & Paint C-141 ac
C    7) DePaint C-130 ac (media blast)
C
```

```
C
C**********************************
C
      SUBROUTINE SPT50_6
      DIMENSION A(100), B(100)
      COMMON/SCOM1/ATRIB(100),DD(100),DDL(100),DTNOW,II,MFA,MSTOP,NCLNR
     1,NCRDR,NPRNT,NNRUN,NNSET,NTAPE,SS(100),SSL(100),TNEXT,TNOW,XX(100)
      EQUIVALENCE(ATRIB(3),WORK)
      EQUIVALENCE(ATRIB(2),WARM)
      EQUIVALENCE(A(15),NEED)
      EQUIVALENCE(A(16),ARIVE)

C
C==============================
C   (1) CHECK IF C-130 AWAITING INCOMING WASH
C==============================
C
      NEXT=MMFE(3)
1     IF (NEXT.EQ.0)GOTO 6
      CALL COPY(-NEXT,3,A)
      IF (A(15).EQ.2.OR.A(15).EQ.3.OR.A(15).EQ.7)GOTO 5
      IF (A(14).GE.1)GOTO 5
      CALL RMOVE(-NEXT,3,ATRIB)
      CALL ENTER(4,ATRIB)
      GOTO 99
5     IF (NSUCR(NEXT).EQ.0)GOTO 6
      NEXT=NSUCR(NEXT)
      GOTO 1
C
C==============================
C   (2) CHECK IF C-130 AWAITING OUTGOING WASH & SCUFF SAND
C==============================
C
6     NEXT=MMFE(3)
7     IF (NEXT.EQ.0)GOTO 11
      CALL COPY(-NEXT,3,A)
      IF (A(15).EQ.2.OR.A(15).EQ.3.OR.A(15).EQ.7)GOTO 10
      IF (A(14).LT.1)GOTO 10
      CALL RMOVE(-NEXT,3,ATRIB)
      CALL ENTER(4,ATRIB)
      GOTO 99
10    IF (NSUCR(NEXT).EQ.0)GOTO 11
      NEXT=NSUCR(NEXT)
      GOTO 7
C
C==============================
C   (3) CHECK FOR A PAINT TYPE = 11
C==============================
C
11    NEXT=MMFE(6)
```

```
12     IF (NEXT.EQ.0)GOTO 16
       CALL COPY(-NEXT,6,A)
       IF ((A(15).EQ.2).OR.(A(15).EQ.3).OR.(A(15).EQ.7))GOTO 15
       IF (A(3).NE.11)GOTO 15
       CALL RMOVE(-NEXT,6,ATRIB)
       CALL ENTER(13,ATRIB)
       GOTO 99
15     IF (NSUCR(NEXT).EQ.0)GOTO 16
       NEXT=NSUCR(NEXT)
       GOTO 12
C
C==============================
C   (4) CHECK FOR A DePAINT C-141
C==============================
C
16     NEXT=MMFE(4)
17     IF (NEXT.EQ.0)GOTO 21
       CALL COPY(-NEXT,4,A)
       IF ((A(15).EQ.2).OR.(A(15).EQ.3).OR.(A(15).EQ.7))GOTO 20
       IF (A(5).NE.141)GOTO 20
       CALL RMOVE(-NEXT,4,ATRIB)
       CALL ENTER(7,ATRIB)
       GOTO 99
20     IF (NSUCR(NEXT).EQ.0)GOTO 21
       NEXT=NSUCR(NEXT)
       GOTO 17
C
C==============================
C   (5) CHECK FOR W/E/A & Paint C-130 AIRCRAFT
C==============================
C
21     NEXT=MMFE(5)
22     IF (NEXT.EQ.0)GOTO 26
       CALL COPY(-NEXT,5,A)
       IF (A(15).EQ.2.OR.A(15).EQ.3.OR.A(15).EQ.7)GOTO 25
       IF (A(3).NE.10)GOTO 25
       CALL RMOVE(-NEXT,5,ATRIB)
       CALL ENTER(10,ATRIB)
       GOTO 99
25     IF (NSUCR(NEXT).EQ.0)GOTO 26
       NEXT=NSUCR(NEXT)
       GOTO 22
C
C==============================
C   (6) CHECK FOR W/E/A & Paint C-141 AIRCRAFT
C==============================
C
26     NEXT=MMFE(5)
27     IF (NEXT.EQ.0)GOTO 31
       CALL COPY(-NEXT,5,A)
```

```
      IF (A(15).EQ.2.OR.A(15).EQ.3.OR.A(15).EQ.7)GOTO 30
      IF (A(5).NE.141)GOTO 30
      CALL RMOVE(-NEXT,5,ATRIB)
      CALL ENTER(10,ATRIB)
      GOTO 99
30    IF (NSUCR(NEXT).EQ.0)GOTO 31
      NEXT=NSUCR(NEXT)
      GOTO 27
C
C-------------------------------
C   (7) CHECK FOR A DePAINT C-130
C-------------------------------
C
31    NEXT=MMFE(4)
32    IF (NEXT.EQ.0)GOTO 99
      CALL COPY(-NEXT,4,A)
      IF ((A(15).EQ.2).OR.(A(15).EQ.3).OR.(A(15).EQ.7))GOTO 35
      IF (A(5).NE.130)GOTO 35
      CALL RMOVE(-NEXT,4,ATRIB)
      CALL ENTER(7,ATRIB)
      GOTO 99
35    IF (NSUCR(NEXT).EQ.0)GOTO 99
      NEXT=NSUCR(NEXT)
      GOTO 32
99    RETURN
      END
C
C*********************************
C
C   THIS IS SUBROUTINE SPT54_6
C
C----------
C    This subroutine is used after Bldg 54 has been freed under SPT
C  dispatching rules IN CONFIGURATION OPTION #6.  The subroutine
C  searches each file from smallest to largest expected processing times
C
C   The order searched for Bldg 54 is as follows:
C
C    1) C-130 INCOMING Wash  2) Outgoing Wash & SS C-130
C    3) Paint C-130 SS AC  4) DePaint C-141 AC
C    5) W/E/A & Paint Stdrd C-130 ac  6)  W/E/A & Paint C-141 ac
C    7) DePaint C-130 ac (media blast)
C
C
C*********************************
C
      SUBROUTINE SPT54_6
      DIMENSION A(100), B(100)
      COMMON/SCOM1/ATRIB(100),DD(100),DDL(100),DTNOW,II,MFA,MSTOP,NCLNR
     1,NCRDR,NPRNT,NNRUN,NNSET,NTAPE,SS(100),SSL(100),TNEXT,TNOW,XX(100)
```

```
      EQUIVALENCE(ATRIB(3),WORK)
      EQUIVALENCE(ATRIB(2),WARM)
      EQUIVALENCE(A(15),NEED)
      EQUIVALENCE(A(16),ARIVE)

C
C==============================
C   (1) CHECK IF C-130 AWAITING INCOMING WASH
C==============================
C
      NEXT=MMFE(3)
1     IF (NEXT.EQ.0)GOTO 6
      CALL COPY(-NEXT,3,A)
      IF (A(15).EQ.1.OR.A(15).EQ.3.OR.A(15).EQ.5)GOTO 5
      IF (A(14).GE.1)GOTO 5
      CALL RMOVE(-NEXT,3,ATRIB)
      CALL ENTER(5,ATRIB)
      GOTO 99
5     IF (NSUCR(NEXT).EQ.0)GOTO 6
      NEXT=NSUCR(NEXT)
      GOTO 1
C
C==============================
C   (2) CHECK IF C-130 AWAITING OUTGOING WASH & SCUFF SAND
C==============================
C
6     NEXT=MMFE(3)
7     IF (NEXT.EQ.0)GOTO 11
      CALL COPY(-NEXT,3,A)
      IF (A(15).EQ.1.OR.A(15).EQ.3.OR.A(15).EQ.5)GOTO 10
      IF (A(14).LT.1)GOTO 10
      CALL RMOVE(-NEXT,3,ATRIB)
      CALL ENTER(5,ATRIB)
      GOTO 99
10    IF (NSUCR(NEXT).EQ.0)GOTO 11
      NEXT=NSUCR(NEXT)
      GOTO 7
C
C==============================
C   (3) CHECK FOR A PAINT TYPE = 11
C==============================
C
11    NEXT=MMFE(6)
12    IF (NEXT.EQ.0)GOTO 16
      CALL COPY(-NEXT,6,A)
      IF ((A(15).EQ.1).OR.(A(15).EQ.3).OR.(A(15).EQ.5))GOTO 15
      IF (A(3).NE.11)GOTO 15
      CALL RMOVE(-NEXT,6,ATRIB)
      CALL ENTER(14,ATRIB)
      GOTO 99
```

```
15    IF (NSUCR(NEXT).EQ.0)GOTO 16
      NEXT=NSUCR(NEXT)
      GOTO 12
C
C===========================================
C   (4) CHECK FOR A DePAINT C-141
C===========================================
C
16    NEXT=MMFE(4)
17    IF (NEXT.EQ.0)GOTO 21
      CALL COPY(-NEXT,4,A)
      IF ((A(15).EQ.1).OR.(A(15).EQ.3).OR.(A(15).EQ.5))GOTO 20
      IF (A(5).NE.141)GOTO 20
      CALL RMOVE(-NEXT,4,ATRIB)
      CALL ENTER(8,ATRIB)
      GOTO 99
20    IF (NSUCR(NEXT).EQ.0)GOTO 21
      NEXT=NSUCR(NEXT)
      GOTO 17
C
C===========================================
C   (5) CHECK FOR W/E/A & Paint C-130 AIRCRAFT
C===========================================
C
21    NEXT=MMFE(5)
22    IF (NEXT.EQ.0)GOTO 26
      CALL COPY(-NEXT,5,A)
      IF (A(15).EQ.1.OR.A(15).EQ.3.OR.A(15).EQ.5)GOTO 25
      IF (A(3).NE.10)GOTO 25
      CALL RMOVE(-NEXT,5,ATRIB)
      CALL ENTER(11,ATRIB)
      GOTO 99
25    IF (NSUCR(NEXT).EQ.0)GOTO 26
      NEXT=NSUCR(NEXT)
      GOTO 22
C
C===========================================
C   (6) CHECK FOR W/E/A & Paint C-141 AIRCRAFT
C===========================================
C
26    NEXT=MMFE(5)
27    IF (NEXT.EQ.0)GOTO 31
      CALL COPY(-NEXT,5,A)
      IF (A(15).EQ.1.OR.A(15).EQ.3.OR.A(15).EQ.5)GOTO 30
      IF (A(5).NE.141)GOTO 30
      CALL RMOVE(-NEXT,5,ATRIB)
      CALL ENTER(11,ATRIB)
      GOTO 99
30    IF (NSUCR(NEXT).EQ.0)GOTO 31
      NEXT=NSUCR(NEXT)
```

```
      GOTO 27
C
C=================================
C   (7) CHECK FOR A DePAINT C-130
C=================================
C
31    NEXT=MMFE(4)
32    IF (NEXT.EQ.0)GOTO 99
      CALL COPY(-NEXT,4,A)
      IF ((A(15).EQ.1).OR.(A(15).EQ.3).OR.(A(15).EQ.5))GOTO 35
      IF (A(5).NE.130)GOTO 35
      CALL RMOVE(-NEXT,4,ATRIB)
      CALL ENTER(8,ATRIB)
      GOTO 99
35    IF (NSUCR(NEXT).EQ.0)GOTO 99
      NEXT=NSUCR(NEXT)
      GOTO 32
99    RETURN
      END
C
C************************************
C
C   THIS IS SUBROUTINE SPT89_6
C
C------------
C    This subroutine is used after Bldg 89 has been freed under SPT
C  dispatching rules IN CONFIGURATION OPTION #6.  The subroutine
C  searches each file from smallest to largest expected processing times
C
C   The order searched for Bldg 89 is as follows:
C
C    1) C-130 INCOMING Wash  2) Outgoing Wash & SS C-130
C    3) Paint C-130 SS AC  4) DePaint C-141 AC
C    5) W/E/A & Paint Stdrd C-130 ac   6)  W/E/A & Paint C-141 ac
C    7) DePaint C-130 ac (media blast)
C
C
C************************************
C
      SUBROUTINE SPT89_6
      DIMENSION A(100), B(100)
      COMMON/SCOM1/ATRIB(100),DD(100),DDL(100),DTNOW,II,MFA,MSTOP,NCLNR
     1,NCRDR,NPRNT,NNRUN,NNSET,NTAPE,SS(100),SSL(100),TNEXT,TNOW,XX(100)
      EQUIVALENCE(ATRIB(3),WORK)
      EQUIVALENCE(ATRIB(2),WARM)
      EQUIVALENCE(A(15),NEED)
      EQUIVALENCE(A(16),ARIVE)

C
C=================================
```

```
C   (1) CHECK IF C-130 AWAITING INCOMING WASH
C=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
C
      NEXT=MMFE(3)
1     IF (NEXT.EQ.0)GOTO 6
      CALL COPY(-NEXT,3,A)
      IF (A(15).EQ.1.OR.A(15).EQ.2.OR.A(15).EQ.4)GOTO 5
      IF (A(14).GE.1)GOTO 5
      CALL RMOVE(-NEXT,3,ATRIB)
      CALL ENTER(6,ATRIB)
      GOTO 99
5     IF (NSUCR(NEXT).EQ.0)GOTO 6
      NEXT=NSUCR(NEXT)
      GOTO 1
C
C=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
C   (2) CHECK IF C-130 AWAITING OUTGOING WASH & SCUFF SAND
C=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
C
6     NEXT=MMFE(3)
7     IF (NEXT.EQ.0)GOTO 11
      CALL COPY(-NEXT,3,A)
      IF (A(15).EQ.1.OR.A(15).EQ.2.OR.A(15).EQ.4)GOTO 10
      IF (A(14).LT.1)GOTO 10
      CALL RMOVE(-NEXT,3,ATRIB)
      CALL ENTER(6,ATRIB)
      GOTO 99
10    IF (NSUCR(NEXT).EQ.0)GOTO 11
      NEXT=NSUCR(NEXT)
      GOTO 7
C
C=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
C   (3) CHECK FOR A PAINT TYPE = 11
C=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
C
11    NEXT=MMFE(6)
12    IF (NEXT.EQ.0)GOTO 16
      CALL COPY(-NEXT,6,A)
      IF ((A(15).EQ.1).OR.(A(15).EQ.2).OR.(A(15).EQ.4))GOTO 15
      IF (A(3).NE.11)GOTO 15
      CALL RMOVE(-NEXT,6,ATRIB)
      CALL ENTER(15,ATRIB)
      GOTO 99
15    IF (NSUCR(NEXT).EQ.0)GOTO 16
      NEXT=NSUCR(NEXT)
      GOTO 12
C
C=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
C   (4) CHECK FOR A DePAINT C-141
C=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
```

```
C
16     NEXT=MMFE(4)
17     IF (NEXT.EQ.0)GOTO 21
       CALL COPY(-NEXT,4,A)
       IF ((A(15).EQ.1).OR.(A(15).EQ.2).OR.(A(15).EQ.4))GOTO 20
       IF (A(5).NE.141)GOTO 20
       CALL RMOVE(-NEXT,4,ATRIB)
       CALL ENTER(9,ATRIB)
       GOTO 99
20     IF (NSUCR(NEXT).EQ.0)GOTO 21
       NEXT=NSUCR(NEXT)
       GOTO 17
C
C=============================
C   (5) CHECK FOR W/E/A & Paint C-130 AIRCRAFT
C=============================
C
21     NEXT=MMFE(5)
22     IF (NEXT.EQ.0)GOTO 26
       CALL COPY(-NEXT,5,A)
       IF (A(15).EQ.1.OR.A(15).EQ.2.OR.A(15).EQ.4)GOTO 25
       IF (A(3).NE.10)GOTO 25
       CALL RMOVE(-NEXT,5,ATRIB)
       CALL ENTER(12,ATRIB)
       GOTO 99
25     IF (NSUCR(NEXT).EQ.0)GOTO 26
       NEXT=NSUCR(NEXT)
       GOTO 22
C
C=============================
C   (6) CHECK FOR W/E/A & Paint C-141 AIRCRAFT
C=============================
C
26     NEXT=MMFE(5)
27     IF (NEXT.EQ.0)GOTO 31
       CALL COPY(-NEXT,5,A)
       IF (A(15).EQ.1.OR.A(15).EQ.2.OR.A(15).EQ.4)GOTO 30
       IF (A(5).NE.141)GOTO 30
       CALL RMOVE(-NEXT,5,ATRIB)
       CALL ENTER(12,ATRIB)
       GOTO 99
30     IF (NSUCR(NEXT).EQ.0)GOTO 31
       NEXT=NSUCR(NEXT)
       GOTO 27
C
C=============================
C   (7) CHECK FOR A DePAINT C-130
C=============================
C
31     NEXT=MMFE(4)
```

```
32    IF (NEXT.EQ.0)GOTO 99
      CALL COPY(-NEXT,4,A)
      IF ((A(15).EQ.1).OR.(A(15).EQ.2).OR.(A(15).EQ.4))GOTO 35
      IF (A(5).NE.130)GOTO 35
      CALL RMOVE(-NEXT,4,ATRIB)
      CALL ENTER(9,ATRIB)
      GOTO 99
35    IF (NSUCR(NEXT).EQ.0)GOTO 99
      NEXT=NSUCR(NEXT)
      GOTO 32
99    RETURN
      END
C
C***********************************************
C    THIS IS SUBROUTINT LNQ
C
C---------------------
C   This subroutine is used for each Largest Number in
C Queue Rule Option.  Passed to this subroutine is the
C hangar number which has just been freed (50, 54, or 89)
C
C***********************************************
C
      SUBROUTINE LNQ(BLDG)
      DIMENSION A(100),ORDER(100)
      INTEGER BLDG, C, J
      COMMON/SCOM1/ATRIB(100),DD(100),DDL(100),DTNOW,II,MFA,MSTOP,NCLNR
     1,NCRDR,NPRNT,NNRUN,NNSET,NTAPE,SS(100),SSL(100),TNEXT,TNOW,XX(100)
C
      C = 0
      DO 5 J = 1, 4
      ORDER(J) = 0
5     CONTINUE
C
C  FIST, DETERMINE THE RANK ORDER OF NUMBER IN QUEUE (Descending size)
C
      IF ((NNQ(3).GE.NNQ(4)).AND.(NNQ(3).GE.NNQ(5)).AND
     2.(NNQ(3).GE.NNQ(6)))GOTO 10
C
      IF ((NNQ(4).GE.NNQ(3)).AND.(NNQ(4).GE.NNQ(5)).AND
     3.(NNQ(4).GE.NNQ(6)))GOTO 15
C
      IF ((NNQ(5).GE.NNQ(3)).AND.(NNQ(5).GE.NNQ(4)).AND
     4.(NNQ(5).GE.NNQ(6)))GOTO 20
C
      IF ((NNQ(6).GE.NNQ(3)).AND.(NNQ(6).GE.NNQ(4)).AND
     5.(NNQ(6).GE.NNQ(5)))GOTO 25
C
10    ORDER(1) = 3
      IF ((NNQ(4).GE.NNQ(5)).AND.(NNQ(4).GE.NNQ(6)))THEN
```

```
       ORDER(2) - 4
       GOTO 35
      ELSE
         IF ((NNQ(5).GE.NNQ(4)).AND.(NNQ(5).GE.NNQ(6)))THEN
         ORDER(2) - 5
         GOTO 34
         ELSE
           ORDER(2) - 6
           GOTO 33
      ENDIF
      ENDIF
C
15    ORDER(1) - 4
      IF ((NNQ(3).GE.NNQ(5)).AND.(NNQ(3).GE.NNQ(6)))THEN
         ORDER(2) - 3
         GOTO 35
      ELSE
         IF ((NNQ(5).GE.NNQ(3)).AND.(NNQ(5).GE.NNQ(6)))THEN
         ORDER(2) - 5
         GOTO 32
         ELSE
          ORDER(2) - 6
          GOTO 31
      ENDIF
      ENDIF
C
20    ORDER(1) - 5
      IF ((NNQ(3).GE.NNQ(4)).AND.(NNQ(3).GE.NNQ(6)))THEN
         ORDER(2) - 3
         GOTO 34
      ELSE
         IF ((NNQ(4).GE.NNQ(3)).AND.(NNQ(4).GE.NNQ(6)))THEN
         ORDER(2) - 4
         GOTO 32
      ELSE
         ORDER(2) -  6
         GOTO 30
      ENDIF
      ENDIF
C
25    ORDER(1) - 6
      IF (NNQ(3).GE.NNQ(4).AND.NNQ(3).GE.NNQ(5))THEN
         ORDER(2) - 3
         GOTO 33
      ELSE
         IF (NNQ(4).GE.NNQ(3).AND.NNQ(4).GE.NNQ(5))THEN
         ORDER(2) - 4
         GOTO 31
      ELSE
         ORDER(2) - 5
```

```
         GOTO 30
      ENDIF
      ENDIF
C
30    IF (NNQ(3).GE.NNQ(4))THEN
         ORDER(3) = 3
         ORDER(4) = 4
         GOTO 50
      ELSE
         ORDER(3) = 4
         ORDER(4) = 3
         GOTO 50
      ENDIF
C
31    IF (NNQ(3).GE.NNQ(5))THEN
         ORDER(3) = 3
         ORDER(4) = 5
         GOTO 50
      ELSE
         ORDER(3) = 5
         ORDER(4) = 3
         GOTO 50
      ENDIF
C
32    IF (NNQ(3).GE.NNQ(6))THEN
         ORDER(3) = 3
         ORDER(4) = 6
         GOTO 50
      ELSE
         ORDER(3) = 6
         ORDER(4) = 3
         GOTO 50
      ENDIF
C
33    IF (NNQ(4).GE.NNQ(5))THEN
         ORDER(3) = 4
         ORDER(4) = 5
         GOTO 50
      ELSE
         ORDER(3) = 5
         ORDER(4) = 4
         GOTO 50
      ENDIF
C
34    IF (NNQ(4).GE.NNQ(6))THEN
         ORDER(3) = 4
         ORDER(4) = 6
         GOTO 50
      ELSE
         ORDER(3) = 6
```

```
          ORDER(4) = 4
          GOTO 50
       ENDIF
C
35     IF (NNQ(5).GE.NNQ(6))THEN
          ORDER(3) = 5
          ORDER(4) = 6
          GOTO 50
       ELSE
          ORDER(3) = 6
          ORDER(4) = 5
          GOTO 50
       ENDIF
C
C  ORDER DETERMINED
C
50     C = C + 1
       IF (ORDER(C).EQ.3)GOTO 300
       IF (ORDER(C).EQ.4)GOTO 400
       IF (ORDER(C).EQ.5)GOTO 500
       IF (ORDER(C).EQ.6)GOTO 600

C
C--------------------
C  LOOK INTO FILE 3 (Wash)
C--------------------
C
300    NEXT=MMFE(3)
310    IF (NEXT.EQ.0)GOTO 700
       CALL COPY(-NEXT,3,A)
       IF (BLDG.NE.50)GOTO 311
       IF ((A(15).EQ.2).OR.(A(15).EQ.3).OR.(A(15).EQ.7))GOTO 315
       GOTO 314
311    IF (BLDG.NE.54)GOTO 312
       IF ((A(15).EQ.1).OR.(A(15).EQ.3).OR.(A(15).EQ.5))GOTO 315
       GOTO 314
312    IF ((A(15).EQ.1).OR.(A(15).EQ.2).OR.(A(15).EQ.4))GOTO 315
314    CALL RMOVE(-NEXT,3,ATRIB)
       GOTO 930
315    IF (NSUCR(NEXT).EQ.0)GOTO 700
       NEXT=NSUCR(NEXT)
       GOTO 310
C
C
C--------------------
C  LOOK INTO FILE 4 (DePaint)
C--------------------
C
400    NEXT=MMFE(4)
410    IF (NEXT.EQ.0)GOTO 700
```

```
      CALL COPY(-NEXT,4,A)
      IF (BLDG.NE.50)GOTO 411
      IF ((A(15).EQ.2).OR.(A(15).EQ.3).OR.(A(15).EQ.7))GOTO 415
      GOTO 414
411   IF (BLDG.NE.54)GOTO 412
      IF ((A(15).EQ.1).OR.(A(15).EQ.3).OR.(A(15).EQ.5))GOTO 415
      GOTO 414
412   IF ((A(15).EQ.1).OR.(A(15).EQ.2).OR.(A(15).EQ.4))GOTO 415
414   CALL RMOVE(-NEXT,4,ATRIB)
      GOTO 940
415   IF (NSUCR(NEXT).EQ.0)GOTO 700
      NEXT=NSUCR(NEXT)
      GOTO 410
C
C-------------------
C  LOOK INTO FILE 5 (W/E/A)
C-------------------
C
500   NEXT=MMFE(5)
510   IF (NEXT.EQ.0)GOTO 700
      CALL COPY(-NEXT,5,A)
      IF (BLDG.NE.50)GOTO 511
      IF ((A(15).EQ.2).OR.(A(15).EQ.3).OR.(A(15).EQ.7))GOTO 515
      GOTO 514
511   IF (BLDG.NE.54)GOTO 512
      IF ((A(15).EQ.1).OR.(A(15).EQ.3).OR.(A(15).EQ.5))GOTO 515
      GOTO 514
512   IF ((A(15).EQ.1).OR.(A(15).EQ.2).OR.(A(15).EQ.4))GOTO 515
514   CALL RMOVE(-NEXT,5,ATRIB)
      GOTO 950
515   IF (NSUCR(NEXT).EQ.0)GOTO 700
      NEXT=NSUCR(NEXT)
      GOTO 510
C
C-------------------
C  LOOK INTO FILE 6 (Paint)
C-------------------
C
600   NEXT=MMFE(6)
610   IF (NEXT.EQ.0)GOTO 700
      CALL COPY(-NEXT,6,A)
      IF (BLDG.NE.50)GOTO 611
      IF ((A(15).EQ.2).OR.(A(15).EQ.3).OR.(A(15).EQ.7))GOTO 615
      GOTO 614
611   IF (BLDG.NE.54)GOTO 612
      IF ((A(15).EQ.1).OR.(A(15).EQ.3).OR.(A(15).EQ.5))GOTO 615
      GOTO 614
612   IF ((A(15).EQ.1).OR.(A(15).EQ.2).OR.(A(15).EQ.4))GOTO 615
614   CALL RMOVE(-NEXT,6,ATRIB)
      GOTO 960
```

```
615   IF (NSUCR(NEXT).EQ.0)GOTO 700
      NEXT=NSUCR(NEXT)
      GOTO 610
C
700   IF (C.LT.4)GOTO 50
      GOTO 999
C
930   IF (BLDG.NE.50)GOTO 931
      CALL ENTER(4,ATRIB)
      GOTO 999
931   IF (BLDG.EQ.89)GOTO 932
      CALL ENTER(5,ATRIB)
      GOTO 999
932   CALL ENTER(6,ATRIB)
      GOTO 999
C
940   IF (BLDG.NE.50)GOTO 941
      CALL ENTER(7,ATRIB)
      GOTO 999
941   IF (BLDG.EQ.89)GOTO 942
      CALL ENTER(8,ATRIB)
      GOTO 999
942   CALL ENTER(9,ATRIB)
      GOTO 999
C
950   IF (BLDG.NE.50)GOTO 951
      CALL ENTER(10,ATRIB)
      GOTO 999
951   IF (BLDG.EQ.89)GOTO 952
      CALL ENTER(11,ATRIB)
      GOTO 999
952   CALL ENTER(12,ATRIB)
      GOTO 999
C
960   IF (BLDG.NE.50)GOTO 961
      CALL ENTER(13,ATRIB)
      GOTO 999
961   IF (BLDG.EQ.89)GOTO 962
      CALL ENTER(14,ATRIB)
      GOTO 999
962   CALL ENTER(15,ATRIB)

999   RETURN
      END
C
C
C*************************************************
C    THIS IS SUBROUTINT AHEAD(BLDG,OPTION)
C*************************************************
C---------------------
```

```
C   This subroutine is used for each Look Ahead dispatching
C Rule Option.  Passed to this subroutine is the
C hangar number which has just been freed (50, 54, or 89),
C and the coded configuration Option (1, 2, 3, 5, or 6)
C
C**********************************************
C
C
      SUBROUTINE AHEAD(BLDG,OPTION)
      DIMENSION WASH(50), DP(50), WEA(50), PNT(50), A(50)
      INTEGER POINT3, POINT4, POINT5, POINT6, I, P, BLDG, OPTION
      COMMON/SCOM1/ATRIB(100),DD(100),DDL(100),DTNOW,II,MFA,MSTOP,NCLNR
     1,NCRDR,NPRNT,NNRUN,NNSET,NTAPE,SS(100),SSL(100),TNEXT,TNOW,XX(100)
C
      SIZE3= 900
      SIZE4= 900
      SIZE5= 900
      SIZE6= 900
      IF (NNQ(3).EQ.0.AND.NNQ(4).EQ.0.AND.NNQ(5).EQ.0.AND.
     2NNQ(6).EQ.0)RETURN
C
C--------------------
C  FIRST CHECK FILE 3
C--------------------
C
1     POINT3=MMFE(3)
2     IF (POINT3.EQ.0)THEN
        SIZE3 = 900
        GOTO 10
      ENDIF
      CALL COPY(-POINT3,3,WASH)
C
      IF (BLDG.NE.50)GOTO 3
      IF (WASH(15).EQ.2.OR.WASH(15).EQ.3.OR.WASH(15).EQ.7)GOTO 7
       ARRIVE3 = WASH(16)
       GOTO 9
3     IF (BLDG.NE.54)GOTO 4
      IF (WASH(15).EQ.1.OR.WASH(15).EQ.3.OR.WASH(15).EQ.5)GOTO 7
       ARRIVE3 = WASH(16)
       GOTO 9
4     IF (WASH(15).EQ.1.OR.WASH(15).EQ.2.OR.WASH(15).EQ.4)GOTO 7
       ARRIVE3 = WASH(16)
       GOTO 9
7     IF (NSUCR(POINT3).EQ.0)THEN
         SIZE3 = 900
         GOTO 10
      ELSE
         POINT3=NSUCR(POINT3)
         GOTO 2
      ENDIF
```

```
C
9     IF (WASH(14).LT.1) THEN
C
C  SS C-130 AWAITING INCOMING WASH
C
        SIZE3 = NNQ(43)
        GOTO 10
      ENDIF
      IF (OPTION.EQ.1) THEN
C
C  SS C-130 AWAITING OUTGOING WASH & SCUFF SAND
C
        SIZE3 = (NNQ(6) + NNQ(12))
        GOTO 10
      ENDIF
      IF (OPTION.EQ.2.OR.OPTION.EQ.3)THEN
        SIZE3 = (NNQ(6) + NNQ(10))
        GOTO 10
      ENDIF
C
      IF (OPTION.EQ.5)THEN
        SIZE3 = (NNQ(6) + NNQ(10) + NNQ(12))
        GOTO 10
      ENDIF
      IF (OPTION.EQ.6)THEN
        SIZE3 = (NNQ(6) + NNQ(10) + NNQ(11) + NNQ(12))
        GOTO 10
      ENDIF
C
C-------------------------------
C  CHECK FILE 4 (DEPAINT)
C-------------------------------
C
10    POINT4=MMFE(4)
11    IF (POINT4.EQ.0)THEN
        SIZE4 = 900
        GOTO 20
      ENDIF
      CALL COPY(-POINT4,4,DP)
      IF (BLDG.NE.50)GOTO 12
      IF (DP(15).EQ.2.OR.DP(15).EQ.3.OR.DP(15).EQ.7)GOTO 17
       ARRIVE4 = DP(16)
       GOTO 19
12    IF (BLDG.NE.54)GOTO 13
      IF (DP(15).EQ.1.OR.DP(15).EQ.3.OR.DP(15).EQ.5)GOTO 17
       ARRIVE4 = DP(16)
       GOTO 19
13    IF (DP(15).EQ.1.OR.DP(15).EQ.2.OR.DP(15).EQ.4)GOTO 17
       ARRIVE4 = DP(16)
       GOTO 19
```

```
17     IF (NSUCR(POINT4).EQ.0)THEN
          SIZE4 = 900
          GOTO 20
       ELSE
          POINT4=NSUCR(POINT4)
          GOTO 11
       ENDIF
C
19     IF (DP(3).EQ.10)THEN
C
C ** STANDARD C-130
C
         SIZE4 = NNQ(43)
         GOTO 20
       ENDIF
       IF (DP(3).EQ.2)THEN
C
C ** SL C-141
C
         SIZE4 = NNQ(20)
         GOTO 20
       ENDIF
       IF (DP(3).EQ.3)THEN
C
C ** SL-PAINT C-141
C
         SIZE4 = NNQ(21)
         GOTO 20
       ENDIF
       IF (DP(3).EQ.4)THEN
C
C ** CW BOX C-141
C
         SIZE4 = NNQ(31)
         GOTO 20
       ENDIF
C
C-----------------------
C   CHECK FILE 5 (W/E/A)
C-----------------------
C
20     POINT5=MMFE(5)
21     IF (POINT5.EQ.0)THEN
         SIZE5 = 900
         GOTO 30
       ENDIF
       CALL COPY(-POINT5,5,WEA)
       IF (BLDG.NE.50)GOTO 22
       IF (WEA(15).EQ.2.OR.WEA(15).EQ.3.OR.WEA(15).EQ.7)GOTO 27
        ARRIVE5 = WEA(16)
```

```
         GOTO 29
22      IF (BLDG.NE.54)GOTO 23
        IF (WEA(15).EQ.1.OR.WEA(15).EQ.3.OR.WEA(15).EQ.5)GOTO 27
         ARRIVE5 = WEA(16)
         GOTO 29
23      IF (WEA(15).EQ.1.OR.WEA(15).EQ.2.OR.WEA(15).EQ.4)GOTO 27
         ARRIVE5 = WEA(16)
         GOTO 29
27      IF (NSUCR(POINT5).EQ.0)THEN
           SIZE5 = 900
           GOTO 30
        ELSE
           POINT5=NSUCR(POINT5)
           GOTO 21
        ENDIF
29      IF (WEA(3).EQ.10)THEN
C
C SS C-130
C
          IF (OPTION.EQ.1)THEN
            SIZE5 = (NNQ(6) + NNQ(12))
            GOTO 30
          ENDIF
        ENDIF
        IF (OPTION.EQ.2.OR.OPTION.EQ.3) THEN
          SIZE5 = (NNQ(6) + NNQ(10))
          GOTO 30
        ENDIF
C
        IF (OPTION.EQ.5)THEN
          SIZE5 = (NNQ(6) + NNQ(10) + NNQ(12))
          GOTO 30
        ENDIF
        IF (OPTION.EQ.6)THEN
          SIZE5 = (NNQ(6) + NNQ(10) + NNQ(11) + NNQ(12))
          GOTO 30
        ENDIF
C
        IF (WEA(3).EQ.2)THEN
C
C SL C-141
C
          SIZE5 = NNQ(20)
          GOTO 30
        ENDIF
        IF (WEA(3).EQ.3)THEN
C
C  SL-PAINT C-141
C
          SIZE5 = NNQ(21)
```

```
         GOTO 30
       ENDIF
       IF (WEA(3).EQ.4)THEN
C
C  CW BOX C-141
C
         SIZE5 = NNQ(31)
         GOTO 30
       ENDIF
C-----------------------------------------------------------
C  CHECK FILE(6)  PAINT (CAN ONLY BE SS C-130) IN THIS FILE
C-----------------------------------------------------------
30     IF (OPTION.EQ.1.AND.BLDG.EQ.54)THEN
         SIZE6 = 900
         GOTO 50
       ENDIF
       IF (OPTION.EQ.2.AND.BLDG.NE.50)THEN
         SIZE6 = 900
         GOTO 50
       ENDIF
       IF (OPTION.EQ.3.AND.BLDG.NE.50)THEN
         SIZE6 = 900
         GOTO 50
       ENDIF
       IF (OPTION.EQ.5.AND.BLDG.EQ.54)THEN
         SIZE6 = 900
         GOTO 50
       ENDIF
       POINT6=MMFE(6)
       IF (POINT6.EQ.0)THEN
         SIZE6 = 900
         GOTO 50
       ENDIF
       CALL COPY(-POINT6,6,PNT)
       ARRIVE6 = PNT(16)
       SIZE6 = 0
       GOTO 50
C
C  ALL FILES CHECKED  DETERMINE LARGEST QUEUE
C
50     IF (SIZE3.LT.SIZE4.AND.SIZE3.LT.SIZE5)GOTO 500
       IF (SIZE4.LT.SIZE3.AND.SIZE4.LT.SIZE5)GOTO 600
       IF (SIZE5.LT.SIZE3.AND.SIZE5.LT.SIZE4)GOTO 700
       IF (SIZE3.EQ.SIZE4.AND.SIZE3.EQ.SIZE5)GOTO 100
       IF (SIZE3.EQ.SIZE4.AND.SIZE3.LT.SIZE5)GOTO 200
       IF (SIZE3.EQ.SIZE5.AND.SIZE3.LT.SIZE4)GOTO 300
       IF (SIZE4.EQ.SIZE5.AND.SIZE4.LT.SIZE3)GOTO 400
C
C-----------
C   ALL AHEAD QUEUES ARE EQUAL IN SIZE
```

```
C------------
100   IF (SIZE3.EQ.900.AND.SIZE6.EQ.900)GOTO 999
      IF (SIZE3.EQ.900.AND.SIZE6.NE.900)GOTO 800
      IF (ARRIVE3.LE.ARRIVE4.AND.ARRIVE3.LE.ARRIVE5)GOTO 500
      IF (ARRIVE4.LE.ARRIVE3.AND.ARRIVE4.LE.ARRIVE5)GOTO 600
      IF (ARRIVE5.LE.ARRIVE3.AND.ARRIVE5.LE.ARRIVE4)GOTO 700
C
C-----------------
C    (1=2)>3 (LOOK AHEAD QUEUES FOR WASH AND DEPAINT EQUAL)
C-----------------
200   IF (ARRIVE3.LE.ARRIVE4)GOTO 500
      GOTO 600
C
C-----------------
C    (1=3)>2 (LOOK AHEAD QUEUES FOR WASH AND W/E/A EQUAL)
C-----------------
300   IF (ARRIVE3.LE.ARRIVE5)GOTO500
      GOTO 700
C
C-----------------
C    (2=3)>1 (LOOK AHEAD QUEUES FOR DEPAINT AND W/E/A EQUAL)
C-----------------
400   IF (ARRIVE4.LE.ARRIVE5)GOTO 600
      GOTO 700
C
C
C  CHOICE HAS BEEN MADE FOR PRIORITY OF SIZE3
C     SIZE4, AND SIZE5....NOW COMPARE AGAINST SIZE6
C
C--------
C  FILE 3 HAS PRIORITY
C--------
500   IF (SIZE6.GE.900)THEN
        CALL RMOVE(-POINT3,3,ATRIB)
        GOTO 930
      ENDIF
      IF (ARRIVE6.LE.ARRIVE3)THEN
        CALL RMOVE(-POINT6,6,ATRIB)
        GOTO 960
      ELSE
        CALL RMOVE(-POINT3,3,ATRIB)
        GOTO 930
      ENDIF
C--------
C  FILE 4 HAS PRIORITY
C--------
600   IF (SIZE6.GE.900)THEN
        CALL RMOVE(-POINT4,4,ATRIB)
        GOTO 940
      ENDIF
```

```
      IF (ARRIVE6.LE.ARRIVE4)THEN
        CALL RMOVE(-POINT6,6,ATRIB)
        GOTO 960
      ELSE
        CALL RMOVE(-POINT4,4,ATRIB)
        GOTO 940
      ENDIF
C-------
C  FILE 5 HAS PRIORITY
C-------
700   IF (SIZE6.GE.900)THEN
        CALL RMOVE(-POINT5,5,ATRIB)
        GOTO 950
      ENDIF
      IF (ARRIVE6.LE.ARRIVE5)THEN
        CALL RMOVE(-POINT6,6,ATRIB)
        GOTO 960
      ELSE
        CALL RMOVE(-POINT5,5,ATRIB)
        GOTO 950
      ENDIF
C
800   CALL RMOVE(-POINT6,6,ATRIB)
      GOTO 960
C
930   IF (BLDG.NE.50)GOTO 931
      CALL ENTER(4,ATRIB)
      GOTO 999
931   IF (BLDG.EQ.89)GOTO 932
      CALL ENTER(5.ATRIB)
      GOTO 999
932   CALL ENTER(6,ATRIB)
      GOTO 999
C
940   IF (BLDG.NE.50)GOTO 941
      CALL ENTER(7,ATRIB)
      GOTO 999
941   IF (BLDG.EQ.89)GOTO 942
      CALL ENTER(8,ATRIB)
      GOTO 999
942   CALL ENTER(9,ATRIB)
      GOTO 999
C
950   IF (BLDG.NE.50)GOTO 951
      CALL ENTER(10,ATRIB)
      GOTO 999
951   IF (BLDG.EQ.89)GOTO 952
      CALL ENTER(11,ATRIB)
      GOTO 999
952   CALL ENTER(12,ATRIB)
```

```
      GOTO 999
C
960   IF (BLDG.NE.50)GOTO 961
      CALL ENTER(13,ATRIB)
      GOTO 999
961   IF (BLDG.EQ.54)GOTO 962
      CALL ENTER(15,ATRIB)
      GOTO 999
962   CALL ENTER(14,ATRIB)
      GOTO 999

999   RETURN
      END
C
C***********************************************
C    THIS IS SUBROUTINT MINUWASH
C***********************************************
C
      SUBROUTINE MINUWASH
      DIMENSION RANK(5)
      COMMON/SCOM1/ATRIB(100),DD(100),DDL(100),DTNOW.II,MFA,MSTOP,NCLNR
     1,NCRDR,NPRNT,NNRUN,NNSET,NTAPE,SS(100),SSL(100),TNEXT,TNOW,XX(100)
C
      COUNT = 0
      K = 0
      DO 1 N = 1, 3
      RANK(K) = 0
1     CONTINUE
C
      UTL54=RRAVG(3)
      UTL89=RRAVG(4)
      UTL50=RRAVG(5)
      IF ((UTL50.LE.UTL54).AND.(UTL50.LE.UTL89))GOTO 2
      IF ((UTL54.LE.UTL89).AND.(UTL54.LE.UTL50))GOTO 3
      IF ((UTL89.LE.UTL54).AND.(UTL89.LE.UTL50))GOTO 4
C
2     RANK(1) = 50
      IF (UTL54.LE.UTL89)THEN
         RANK(2) = 54
         RANK(3) = 89
         GOTO 5
      ELSE
         RANK(2) = 89
         RANK(3) = 54
         GOTO 5
      ENDIF
      RETURN
C
3     RANK(1) = 54
      IF (UTL50.LE.UTL89)THEN
```

```
            RANK(2) = 50
            RANK(3) = 89
            GOTO 5
         ELSE
            RANK(2) = 89
            RANK(3) = 50
            GOTO 5
         ENDIF
         RETURN
C
4        RANK(1) = 89
         IF (UTL50.LE.UTL54)THEN
            RANK(2) = 50
            RANK(3) = 54
            GOTO 5
         ELSE
            RANK(2) = 54
            RANK(3) = 50
            GOTO 5
         ENDIF
         RETURN
C
C  **  RANK DETERMINED **
C
5        COUNT = COUNT + 1
         IF (RANK(COUNT).EQ.50)GOTO 10
         IF (RANK(COUNT).EQ.54)GOTO 20
         IF (RANK(COUNT).EQ.89)GOTO 30
C
C-------------------------------------------------------
C This portion used if Bldg 50 has smallest utilization
C-------------------------------------------------------
C
10       IF (ATRIB(15).EQ.2.OR.ATRIB(15).EQ.3.OR.ATRIB(15).EQ.7)GOTO 12
         IF (NRUSE(5).EQ.0.AND.NNQ(10).EQ.0)THEN
            CALL ENTER(4,ATRIB)
            RETURN
         ELSE
12          IF (COUNT.LT.3)GOTO 5
            IF (COUNT.GE.3)GOTO 90
         ENDIF
         RETURN
C
C-------------------------------------------------------
C This portion used if Bldg 54 has smallest utilization
C-------------------------------------------------------
C
20       IF (ATRIB(15).EQ.1.OR.ATRIB(15).EQ.3.OR.ATRIB(15).EQ.5)GOTO 22
         IF (NRUSE(3).EQ.0.AND.NNQ(11).EQ.0)THEN
            CALL ENTER(5,ATRIB)
```

```
          RETURN
       ELSE
22        IF (COUNT.LT.3)GOTO 5
          IF (COUNT.GE.3)GOTO 90
       ENDIF
       RETURN
C
C-----------------------------------------------------------
C This portion used if Bldg 89 has smallest utilization
C-----------------------------------------------------------
C
30     IF (ATRIB(15).EQ.1.OR.ATRIB(15).EQ.2.OR.ATRIB(15).EQ.4)GOTO 32
       IF (NRUSE(4).EQ.0.AND.NNQ(12).EQ.0)THEN
          CALL ENTER(6,ATRIB)
          RETURN
       ELSE
32        IF (COUNT.LT.3)GOTO 5
          IF (COUNT.GE.3)GOTO 90
       ENDIF
90     CALL FILEM(3,ATRIB)
99     RETURN
       END
C
C*************************************************
C    THIS IS SUBROUTINT MINUDP
C*************************************************
C
       SUBROUTINE MINUDP
       DIMENSION RANK(5)
       INTEGER K, N, COUNT
       COMMON/SCOM1/ATRIB(100),DD(100),DDL(100),DTNOW,II,MFA,MSTOP,NCLNR
      1,NCRDR,NPRNT,NNRUN,NNSET,NTAPE,SS(100),SSL(100),TNEXT,TNOW,XX(100)
C
       COUNT = 0
       K = 0
       DO 1 N = 1, 3
       RANK(K) = 0
1      CONTINUE
C
       UTL54=RRAVG(3)
       UTL89=RRAVG(4)
       UTL50=RRAVG(5)
       IF ((UTL50.LE.UTL54).AND.(UTL50.LE.UTL89))GOTO 2
       IF ((UTL54.LE.UTL89).AND.(UTL54.LE.UTL50))GOTO 3
       IF ((UTL89.LE.UTL54).AND.(UTL89.LE.UTL50))GOTO 4
C
2      RANK(1) = 50
       IF (UTL54.LE.UTL89)THEN
          RANK(2) = 54
          RANK(3) = 89
```

```
         GOTO 5
      ELSE
         RANK(2) - 89
         RANK(3) - 54
         GOTO 5
      ENDIF
      RETURN
C
3     RANK(1) - 54
      IF (UTL50.LE.UTL89)THEN
         RANK(2) - 50
         RANK(3) - 89
         GOTO 5
      ELSE
         RANK(2) - 89
         RANK(3) - 50
         GOTO 5
      ENDIF
      RETURN
C
4     RANK(1) - 89
      IF (UTL50.LE.UTL54)THEN
         RANK(2) - 50
         RANK(3) - 54
         GOTO 5
      ELSE
         RANK(2) - 54
         RANK(3) - 50
         GOTO 5
      ENDIF
      RETURN
C
C  **  RANK DETERMINED **
C
5     COUNT - COUNT + 1
      IF (RANK(COUNT).EQ.50)GOTO 10
      IF (RANK(COUNT).EQ.54)GOTO 20
      IF (RANK(COUNT).EQ.89)GOTO 30
C
C------------------------------------------------------------
C This portion used if Bldg 50 has smallest utilization
C------------------------------------------------------------
C
10    IF (ATRIB(15).EQ.2.OR.ATRIB(15).EQ.3.OR.ATRIB(15).EQ.7)GOTO 12
      IF (NRUSE(5).EQ.0.AND.NNQ(10).EQ.0)THEN
         CALL ENTER(7,ATRIB)
         RETURN
      ELSE
12       IF (COUNT.LT.3)GOTO 5
         IF (COUNT.GE.3)GOTO 90
```

```
      ENDIF
      RETURN
C
C---------------------------------------------------------
C This portion used if Bldg 54 has smallest utilization
C---------------------------------------------------------
C
20    IF (ATRIB(15).EQ.1.OR.ATRIB(15).EQ.3.OR.ATRIB(15).EQ.5)GOTO 22
      IF (NRUSE(3).EQ.0.AND.NNQ(11).EQ.0)THEN
         CALL ENTER(8,ATRIB)
         RETURN
      ELSE
22       IF (COUNT.LT.3)GOTO 5
         IF (COUNT.GE.3)GOTO 90
      ENDIF
      RETURN
C
C---------------------------------------------------------
C This portion used if Bldg 89 has smallest utilization
C---------------------------------------------------------
C
30    IF (ATRIB(15).EQ.1.OR.ATRIB(15).EQ.2.OR.ATRIB(15).EQ.4)GOTO 32
      IF (NRUSE(4).EQ.0.AND.NNQ(12).EQ.0)THEN
         CALL ENTER(9,ATRIB)
         RETURN
      ELSE
32       IF (COUNT.LT.3)GOTO 5
         IF (COUNT.GE.3)GOTO 90
      ENDIF
90    CALL FILEM(4,ATRIB)
99    RETURN
      END
C
C***********************************************
C     THIS IS SUBROUTINT MINUWEA
C***********************************************
C
      SUBROUTINE MINUWEA
      DIMENSION RANK(5)
      COMMON/SCOM1/ATRIB(100),DD(100),DDL(100),DTNOW,II,MFA,MSTOP,NCLNR
     1,NCRDR,NPRNT,NNRUN,NNSET,NTAPE,SS(100),SSL(100),TNEXT,TNOW,XX(100)
C
      COUNT = 0
      K = 0
      DO 1 N = 1, 3
      RANK(K) = 0
1     CONTINUE
C
      UTL54=RRAVG(3)
      UTL89=RRAVG(4)
```

```
      UTL50=RRAVG(5)
      IF ((UTL50.LE.UTL54).AND.(UTL50.LE.UTL89))GOTO 2
      IF ((UTL54.LE.UTL89).AND.(UTL54.LE.UTL50))GOTO 3
      IF ((UTL89.LE.UTL54).AND.(UTL89.LE.UTL50))GOTO 4
C
2     RANK(1) = 50
      IF (UTL54.LE.UTL89)THEN
         RANK(2) = 54
         RANK(3) = 89
         GOTO 5
      ELSE
         RANK(2) = 89
         RANK(3) = 54
         GOTO 5
      ENDIF
      RETURN
C
3     RANK(1) = 54
      IF (UTL50.LE.UTL89)THEN
         RANK(2) = 50
         RANK(3) = 89
         GOTO 5
      ELSE
         RANK(2) = 89
         RANK(3) = 50
         GOTO 5
      ENDIF
      RETURN
C
4     RANK(1) = 89
      IF (UTL50.LE.UTL54)THEN
         RANK(2) = 50
         RANK(3) = 54
         GOTO 5
      ELSE
         RANK(2) = 54
         RANK(3) = 50
         GOTO 5
      ENDIF
      RETURN
C
C  **  RANK DETERMINED **
C
5     COUNT = COUNT + 1
      IF (RANK(COUNT).EQ.50)GOTO 10
      IF (RANK(COUNT).EQ.54)GOTO 20
      IF (RANK(COUNT).EQ.89)GOTO 30
C
C------------------------------------------------------------
C This portion used if Bldg 50 has smallest utilization
```

```
C-----------------------------------------------------------
C
10     IF (ATRIB(15).EQ.2.OR.ATRIB(15).EQ.3.OR.ATRIB(15).EQ.7)GOTO 12
       IF (NRUSE(5).EQ.0.AND.NNQ(10).EQ.0)THEN
          CALL ENTER(10,ATRIB)
          RETURN
       ELSE
12        IF (COUNT.LT.3)GOTO 5
          IF (COUNT.GE.3)GOTO 90
       ENDIF
       RETURN
C
C-----------------------------------------------------------
C This portion used if Bldg 54 has smallest utilization
C-----------------------------------------------------------
C
20     IF (ATRIB(15).EQ.1.OR.ATRIB(15).EQ.3.OR.ATRIB(15).EQ.5)GOTO 22
       IF (NRUSE(3).EQ.0.AND.NNQ(11).EQ.0)THEN
          CALL ENTER(11,ATRIB)
          RETURN
       ELSE
22        IF (COUNT.LT.3)GOTO 5
          IF (COUNT.GE.3)GOTO 90
       ENDIF
       RETURN
C
C-----------------------------------------------------------
C This portion used if Bldg 89 has smallest utilization
C-----------------------------------------------------------
C
30     IF (ATRIB(15).EQ.1.OR.ATRIB(15).EQ.2.OR.ATRIB(15).EQ.4)GOTO 32
       IF (NRUSE(4).EQ.0.AND.NNQ(12).EQ.0)THEN
          CALL ENTER(12,ATRIB)
          RETURN
       ELSE
32        IF (COUNT.LT.3)GOTO 5
          IF (COUNT.GE.3)GOTO 90
       ENDIF
90     CALL FILEM(5,ATRIB)
99     RETURN
       END
C
C*************************************************
C    THIS IS SUBROUTINT MINUPAINT
C*************************************************
C
       SUBROUTINE MINUPAINT
       DIMENSION RANK(5)
       COMMON/SCOM1/ATRIB(100),DD(100),DDL(100),DTNOW,II,MFA,MSTOP,NCLNR
      1,NCRDR,NPRNT,NNRUN,NNSET,NTAPE,SS(100),SSL(100),TNEXT,TNOW,XX(100)
```

```
C
      COUNT = 0
      K = 0
      DO 1 N = 1, 3
      RANK(K) = 0
1     CONTINUE
C
      UTL54=RRAVG(3)
      UTL89=RRAVG(4)
      UTL50=RRAVG(5)
      IF ((UTL50.LE.UTL54).AND.(UTL50.LE.UTL89))GOTO 2
      IF ((UTL54.LE.UTL89).AND.(UTL54.LE.UTL50))GOTO 3
      IF ((UTL89.LE.UTL54).AND.(UTL89.LE.UTL50))GOTO 4
C
2     RANK(1) = 50
      IF (UTL54.LE.UTL89)THEN
         RANK(2) = 54
         RANK(3) = 89
         GOTO 5
      ELSE
         RANK(2) = 89
         RANK(3) = 54
         GOTO 5
      ENDIF
      RETURN
C
3     RANK(1) = 54
      IF (UTL50.LE.UTL89)THEN
         RANK(2) = 50
         RANK(3) = 89
         GOTO 5
      ELSE
         RANK(2) = 89
         RANK(3) = 50
         GOTO 5
      ENDIF
      RETURN
C
4     RANK(1) = 89
      IF (UTL50.LE.UTL54)THEN
         RANK(2) = 50
         RANK(3) = 54
         GOTO 5
      ELSE
         RANK(2) = 54
         RANK(3) = 50
         GOTO 5
      ENDIF
      RETURN
C
```

```
C  **  RANK DETERMINED **
C
5      COUNT = COUNT + 1
       IF (RANK(COUNT).EQ.50)GOTO 10
       IF (RANK(COUNT).EQ.54)GOTO 20
       IF (RANK(COUNT).EQ.89)GOTO 30
C
C-----------------------------------------------------------
C This portion used if Bldg 50 has smallest utilization
C-----------------------------------------------------------
C
10     IF (ATRIB(15).EQ.2.OR.ATRIB(15).EQ.3.OR.ATRIB(15).EQ.7)GOTO 12
       IF (NRUSE(5).EQ.0.AND.NNQ(10).EQ.0)THEN
          CALL ENTER(13,ATRIB)
          RETURN
       ELSE
12        IF (COUNT.LT.3)GOTO 5
          IF (COUNT.GE.3)GOTO 90
       ENDIF
       RETURN
C
C-----------------------------------------------------------
C This portion used if Bldg 54 has smallest utilization
C-----------------------------------------------------------
C
20     IF (ATRIB(15).EQ.1.OR.ATRIB(15).EQ.3.OR.ATRIB(15).EQ.5)GOTO 22
       IF (NRUSE(3).EQ.0.AND.NNQ(11).EQ.0)THEN
          CALL ENTER(14,ATRIB)
          RETURN
       ELSE
22        IF (COUNT.LT.3)GOTO 5
          IF (COUNT.GE.3)GOTO 90
       ENDIF
       RETURN
C
C-----------------------------------------------------------
C This portion used if Bldg 89 has smallest utilization
C-----------------------------------------------------------
C
30     IF (ATRIB(15).EQ.1.OR.ATRIB(15).EQ.2.OR.ATRIB(15).EQ.4)GOTO 32
       IF (NRUSE(4).EQ.0.AND.NNQ(12).EQ.0)THEN
          CALL ENTER(15,ATRIB)
          RETURN
       ELSE
32        IF (COUNT.LT.3)GOTO 5
          IF (COUNT.GE.3)GOTO 90
       ENDIF
90     CALL FILEM(6,ATRIB)
99     RETURN
       END
```

```
C
C************************************************
C    THIS IS SUBROUTINT FCWASH
C************************************************
C
      SUBROUTINE FCWASH
      DIMENSION RANK(5)
      COMMON/SCOM1/ATRIB(100),DD(100),DDL(100),DTNOW,II,MFA,MSTOP,NCLNR
     1,NCRDR,NPRNT,NNRUN,NNSET,NTAPE,SS(100),SSL(100),TNEXT,TNOW,XX(100)
C
      COUNT = 0
      K = 0
      DO 1 N = 1, 3
      RANK(K) = 0
1     CONTINUE
C
      TLC54=RRTLC(3)
      TLC89=RRTLC(4)
      TLC50=RRTLC(5)
C
      IF ((TLC50.LE.TLC54).AND.(TLC50.LE.TLC89))GOTO 2
      IF ((TLC54.LE.TLC89).AND.(TLC54.LE.TLC50))GOTO 3
      IF ((TLC89.LE.TLC54).AND.(TLC89.LE.TLC50))GOTO 4
C
2     RANK(1) = 50
      IF (TLC54.LE.TLC89)THEN
         RANK(2) = 54
         RANK(3) = 89
         GOTO 5
      ELSE
         RANK(2) = 89
         RANK(3) = 54
         GOTO 5
      ENDIF
      RETURN
C
3     RANK(1) = 54
      IF (TLC50.LE.TLC89)THEN
         RANK(2) = 50
         RANK(3) = 89
         GOTO 5
      ELSE
         RANK(2) = 89
         RANK(3) = 50
         GOTO 5
      ENDIF
      RETURN
C
4     RANK(1) = 89
      IF (TLC50.LE.TLC54)THEN
```

```
         RANK(2) = 50
         RANK(3) = 54
         GOTO 5
      ELSE
         RANK(2) = 54
         RANK(3) = 50
         GOTO 5
      ENDIF
      RETURN
C
C  **  RANK DETERMINED **
C
5     COUNT = COUNT + 1
      IF (RANK(COUNT).EQ.50)GOTO 10
      IF (RANK(COUNT).EQ.54)GOTO 20
      IF (RANK(COUNT).EQ.89)GOTO 30
C
C-------------------------------------------------------
C This portion used if Bldg 50 has smallest utilization
C-------------------------------------------------------
C
10    IF (ATRIB(15).EQ.2.OR.ATRIB(15).EQ.3.OR.ATRIB(15).EQ.7)GOTO 12
      IF (NRUSE(5).EQ.0.AND.NNQ(10).EQ.0)THEN
         CALL ENTER(4,ATRIB)
         RETURN
      ELSE
12       IF (COUNT.LT.3)GOTO 5
         IF (COUNT.GE.3)GOTO 90
      ENDIF
      RETURN
C
C-------------------------------------------------------
C This portion used if Bldg 54 has smallest utilization
C-------------------------------------------------------
C
20    IF (ATRIB(15).EQ.1.OR.ATRIB(15).EQ.3.OR.ATRIB(15).EQ.5)GOTO 22
      IF (NRUSE(3).EQ.0.AND.NNQ(11).EQ.0)THEN
         CALL ENTER(5,ATRIB)
         RETURN
      ELSE
22       IF (COUNT.LT.3)GOTO 5
         IF (COUNT.GE.3)GOTO 90
      ENDIF
      RETURN
C
C-------------------------------------------------------
C This portion used if Bldg 89 has smallest utilization
C-------------------------------------------------------
C
30    IF (ATRIB(15).EQ.1.OR.ATRIB(15).EQ.2.OR.ATRIB(15).EQ.4)GOTO 32
```

```
      IF (NRUSE(4).EQ.0.AND.NNQ(12).EQ.0)THEN
         CALL ENTER(6,ATRIB)
         RETURN
      ELSE
32       IF (COUNT.LT.3)GOTO 5
         IF (COUNT.GE.3)GOTO 90
      ENDIF
90    CALL FILEM(3,ATRIB)
99    RETURN
      END
C
C************************************************
C    THIS IS SUBROUTINT FCDP
C************************************************
C
      SUBROUTINE FCDP
      DIMENSION RANK(5)
      COMMON/SCOM1/ATRIB(100),DD(100),DDL(100),DTNOW,II,MFA,MSTOP,NCLNR
     1,NCRDR,NPRNT,NNRUN,NNSET,NTAPE,SS(100),SSL(100),TNEXT,TNOW,XX(100)
C
      COUNT = 0
      K = 0
      DO 1 N = 1, 3
      RANK(K) = 0
1     CONTINUE
C
      TLC54=RRTLC(3)
      TLC89=RRTLC(4)
      TLC50=RRTLC(5)
      IF ((TLC50.LE.TLC54).AND.(TLC50.LE.TLC89))GOTO 2
      IF ((TLC54.LE.TLC89).AND.(TLC54.LE.TLC50))GOTO 3
      IF ((TLC89.LE.TLC54).AND.(TLC89.LE.TLC50))GOTO 4
C
2     RANK(1) = 50
      IF (TLC54.LE.TLC89)THEN
         RANK(2) = 54
         RANK(3) = 89
         GOTO 5
      ELSE
         RANK(2) = 89
         RANK(3) = 54
         GOTO 5
      ENDIF
      RETURN
C
3     RANK(1) = 54
      IF (TLC50.LE.TLC89)THEN
         RANK(2) = 50
         RANK(3) = 89
         GOTO 5
```

```
      ELSE
         RANK(2) = 89
         RANK(3) = 50
         GOTO 5
      ENDIF
      RETURN
C
4     RANK(1) = 89
      IF (TLC50.LE.TLC54)THEN
         RANK(2) = 50
         RANK(3) = 54
         GOTO 5
      ELSE
         RANK(2) = 54
         RANK(3) = 50
         GOTO 5
      ENDIF
      RETURN
C
C  **  RANK DETERMINED **
C
5     COUNT = COUNT + 1
      IF (RANK(COUNT).EQ.50)GOTO 10
      IF (RANK(COUNT).EQ.54)GOTO 20
      IF (RANK(COUNT).EQ.89)GOTO 30
C
C-------------------------------------------------------
C This portion used if Bldg 50 has smallest utilization
C-------------------------------------------------------
C
10    IF (ATRIB(15).EQ.2.OR.ATRIB(15).EQ.3.OR.ATRIB(15).EQ.7)GOTO 12
      IF (NRUSE(5).EQ.0.AND.NNQ(10).EQ.0)THEN
         CALL ENTER(7,ATRIB)
         RETURN
      ELSE
12       IF (COUNT.LT.3)GOTO 5
         IF (COUNT.GE.3)GOTO 90
      ENDIF
      RETURN
C
C-------------------------------------------------------
C This portion used if Bldg 54 has smallest utilization
C-------------------------------------------------------
C
20    IF (ATRIB(15).EQ.1.OR.ATRIB(15).EQ.3.OR.ATRIB(15).EQ.5)GOTO 22
      IF (NRUSE(3).EQ.0.AND.NNQ(11).EQ.0)THEN
         CALL ENTER(8,ATRIB)
         RETURN
      ELSE
22       IF (COUNT.LT.3)GOTO 5
```

```
         IF (COUNT.GE.3)GOTO 90
      ENDIF
      RETURN
C
C------------------------------------------------------------
C This portion used if Bldg 89 has smallest utilization
C------------------------------------------------------------
C
30    IF (ATRIB(15).EQ.1.OR.ATRIB(15).EQ.2.OR.ATRIB(15).EQ.4)GOTO 32
      IF (NRUSE(4).EQ.0.AND.NNQ(12).EQ.0)THEN
         CALL ENTER(9,ATRIB)
         RETURN
      ELSE
32       IF (COUNT.LT.3)GOTO 5
         IF (COUNT.GE.3)GOTO 90
      ENDIF
90    CALL FILEM(4,ATRIB)
99    RETURN
      END
C
C*************************************************
C    THIS IS SUBROUTINT FCWEA
C*************************************************
C
      SUBROUTINE FCWEA
      DIMENSION RANK(5)
      COMMON/SCOM1/ATRIB(100),DD(100),DDL(100),DTNOW,II,MFA,MSTOP,NCLNR
     1,NCRDR,NPRNT,NNRUN,NNSET,NTAPE,SS(100),SSL(100),TNEXT,TNOW,XX(100)
C
      COUNT = 0
      K = 0
      DO 1 N = 1, 3
      RANK(K) = 0
1     CONTINUE
C
      TLC54=RRTLC(3)
      TLC89=RRTLC(4)
      TLC50=RRTLC(5)
      IF ((TLC50.LE.TLC54).AND.(TLC50.LE.TLC89))GOTO 2
      IF ((TLC54.LE.TLC89).AND.(TLC54.LE.TLC50))GOTO 3
      IF ((TLC89.LE.TLC54).AND.(TLC89.LE.TLC50))GOTO 4
C
2     RANK(1) = 50
      IF (TLC54.LE.TLC89)THEN
         RANK(2) = 54
         RANK(3) = 89
         GOTO 5
      ELSE
         RANK(2) = 89
         RANK(3) = 54
```

```
         GOTO 5
      ENDIF
      RETURN
C
3     RANK(1) = 54
      IF (TLC50.LE.TLC89)THEN
         RANK(2) = 50
         RANK(3) = 89
         GOTO 5
      ELSE
         RANK(2) = 89
         RANK(3) = 50
         GOTO 5
      ENDIF
      RETURN
C
4     RANK(1) = 89
      IF (TLC50.LE.TLC54)THEN
         RANK(2) = 50
         RANK(3) = 54
         GOTO 5
      ELSE
         RANK(2) = 54
         RANK(3) = 50
         GOTO 5
      ENDIF
      RETURN
C
C  **  RANK DETERMINED **
C
5     COUNT = COUNT + 1
      IF (RANK(COUNT).EQ.50)GOTO 10
      IF (RANK(COUNT).EQ.54)GOTO 20
      IF (RANK(COUNT).EQ.89)GOTO 30
C
C-------------------------------------------------------
C This portion used if Bldg 50 has smallest utilization
C-------------------------------------------------------
C
10    IF (ATRIB(15).EQ.2.OR.ATRIB(15).EQ.3.OR.ATRIB(15).EQ.7)GOTO 12
      IF (NRUSE(5).EQ.0.AND.NNQ(10).EQ.0)THEN
         CALL ENTER(10,ATRIB)
         RETURN
      ELSE
12       IF (COUNT.LT.3)GOTO 5
         IF (COUNT.GE.3)GOTO 90
      ENDIF
      RETURN
C
C-------------------------------------------------------
```

```
C This portion used if Bldg 54 has smallest utilization
C-------------------------------------------------------
C
20     IF (ATRIB(15).EQ.1.OR.ATRIB(15).EQ.3.OR.ATRIB(15).EQ.5)GOTO 22
       IF (NRUSE(3).EQ.0.AND.NNQ(11).EQ.0)THEN
          CALL ENTER(11,ATRIB)
          RETURN
       ELSE
22        IF (COUNT.LT.3)GOTO 5
          IF (COUNT.GE.3)GOTO 90
       ENDIF
       RETURN
C
C-------------------------------------------------------
C This portion used if Bldg 89 has smallest utilization
C-------------------------------------------------------
C
30     IF (ATRIB(15).EQ.1.OR.ATRIB(15).EQ.2.OR.ATRIB(15).EQ.4)GOTO 32
       IF (NRUSE(4).EQ.0.AND.NNQ(12).EQ.0)THEN
          CALL ENTER(12,ATRIB)
          RETURN
       ELSE
32        IF (COUNT.LT.3)GOTO 5
          IF (COUNT.GE.3)GOTO 90
       ENDIF
90     CALL FILEM(5,ATRIB)
99     RETURN
       END
C
C************************************************
C    THIS IS SUBROUTINT FCPAINT
C************************************************
C
       SUBROUTINE FCPAINT
       DIMENSION RANK(5)
       COMMON/SCOM1/ATRIB(100),DD(100),DDL(100),DTNOW,II,MFA,MSTOP,NCLNR
      1,NCRDR,NPRNT,NNRUN,NNSET,NTAPE,SS(100),SSL(100),TNEXT,TNOW,XX(100)
C
       COUNT = 0
       K = 0
       DO 1 N = 1, 3
       RANK(K) = 0
1      CONTINUE
C
       TLC54=RRTLC(3)
       TLC89=RRTLC(4)
       TLC50=RRTLC(5)
       IF ((TLC50.LE.TLC54).AND.(TLC50.LE.TLC89))GOTO 2
       IF ((TLC54.LE.TLC89).AND.(TLC54.LE.TLC50))GOTO 3
       IF ((TLC89.LE.TLC54).AND.(TLC89.LE.TLC50))GOTO 4
```

```
C
2     RANK(1) = 50
      IF (TLC54.LE.TLC89)THEN
         RANK(2) = 54
         RANK(3) = 89
         GOTO 5
      ELSE
         RANK(2) = 89
         RANK(3) = 54
         GOTO 5
      ENDIF
      RETURN
C
3     RANK(1) = 54
      IF (TLC50.LE.TLC89)THEN
         RANK(2) = 50
         RANK(3) = 89
         GOTO 5
      ELSE
         RANK(2) = 89
         RANK(3) = 50
         GOTO 5
      ENDIF
      RETURN
C
4     RANK(1) = 89
      IF (TLC50.LE.TLC54)THEN
         RANK(2) = 50
         RANK(3) = 54
         GOTO 5
      ELSE
         RANK(2) = 54
         RANK(3) = 50
         GOTO 5
      ENDIF
      RETURN
C
C  **  RANK DETERMINED **
C
5     COUNT = COUNT + 1
      IF (RANK(COUNT).EQ.50)GOTO 10
      IF (RANK(COUNT).EQ.54)GOTO 20
      IF (RANK(COUNT).EQ.89)GOTO 30
C
C-----------------------------------------------------------------
C This portion used if Bldg 50 has smallest utilization
C-----------------------------------------------------------------
C
10    IF (ATRIB(15).EQ.2.OR.ATRIB(15).EQ.3.OR.ATRIB(15).EQ.7)GOTO 12
      IF (NRUSE(5).EQ.0.AND.NNQ(10).EQ.0)THEN
```

```
          CALL ENTER(13,ATRIB)
          RETURN
       ELSE
12        IF (COUNT.LT.3)GOTO 5
          IF (COUNT.GE.3)GOTO 90
       ENDIF
       RETURN
C
C-------------------------------------------------------
C This portion used if Bldg 54 has smallest utilization
C-------------------------------------------------------
C
20     IF (ATRIB(15).EQ.1.OR.ATRIB(15).EQ.3.OR.ATRIB(15).EQ.5)GOTO 22
       IF (NRUSE(3).EQ.0.AND.NNQ(11).EQ.0)THEN
          CALL ENTER(14,ATRIB)
          RETURN
       ELSE
22        IF (COUNT.LT.3)GOTO 5
          IF (COUNT.GE.3)GOTO 90
       ENDIF
       RETURN
C
C-------------------------------------------------------
C This portion used if Bldg 89 has smallest utilization
C-------------------------------------------------------
C
30     IF (ATRIB(15).EQ.1.OR.ATRIB(15).EQ.2.OR.ATRIB(15).EQ.4)GOTO 32
       IF (NRUSE(4).EQ.0.AND.NNQ(12).EQ.0)THEN
          CALL ENTER(15,ATRIB)
          RETURN
       ELSE
32        IF (COUNT.LT.3)GOTO 5
          IF (COUNT.GE.3)GOTO 90
       ENDIF
90     CALL FILEM(6,ATRIB)
99     RETURN
       END
C
C************************************************
C    THIS IS SUBROUTINT WEA_5_FC
C************************************************
C
       SUBROUTINE WEA_5_FC
       DIMENSION RANK(5)
       COMMON/SCOM1/ATRIB(100),DD(100),DDL(100),DTNOW,II,MFA,MSTOP,NCLNR
      1,NCRDR,NPRNT,NNRUN,NNSET,NTAPE,SS(100),SSL(100),TNEXT,TNOW,XX(100)
C
       TLC89=RRTLC(4)
       TLC50=RRTLC(5)
       IF (TLC50.LE.TLC89)GOTO 4
```

```
      IF (TLC89.LE.TLC50)GOTO 2
C
2     IF (NRUSE(4).EQ.0)THEN
         CALL ENTER(15,ATRIB)
         RETURN
      ELSE
         CALL ENTER(13,ATRIB)
         RETURN
      ENDIF
C
4     IF (NRUSE(5).EQ.0)THEN
         CALL ENTER(13,ATRIB)
         RETURN
      ELSE
         CALL ENTER(15,ATRIB)
         RETURN
      ENDIF
      END
C
C************************************************
C    THIS IS SUBROUTINT WEA_5_MINU
C************************************************
C
      SUBROUTINE WEA_5_MINU
      DIMENSION RANK(5)
      COMMON/SCOM1/ATRIB(100),DD(100),DDL(100),DTNOW,II,MFA,MSTOP,NCLNR
     1,NCRDR,NPRNT,NNRUN,NNSET,NTAPE,SS(100),SSL(100),TNEXT,TNOW,XX(100)
C
      UTL89=RRAVG(4)
      UTL50=RRAVG(5)
      IF (UTL50.LE.UTL89)GOTO 4
      IF (UTL89.LE.UTL50)GOTO 2
C
2     IF (NRUSE(4).EQ.0)THEN
         CALL ENTER(15,ATRIB)
         RETURN
      ELSE
         CALL ENTER(13,ATRIB)
         RETURN
      ENDIF
C
4     IF (NRUSE(5).EQ.0)THEN
         CALL ENTER(13,ATRIB)
         RETURN
      ELSE
         CALL ENTER(15,ATRIB)
         RETURN
      ENDIF
      END
C
```

```
C***********************************************
C    THIS IS SUBROUTINT OTPUT
C***********************************************
C
C    This Subroutine prints desired output to
C  external files for future manipulation
C-----------------------------------------------
C
      SUBROUTINE OTPUT
      COMMON/SCOM1/ATRIB(100),DD(100),DDL(100),DTNOW,II,MFA,MSTOP,NCLNR
     1,NCRDR,NPRNT,NNRUN,NNSET,NTAPE,SS(100),SSL(100),TNEXT,TNOW,XX(100)
C
C  COLLECT TIME IN SYSTEM STATS
C
C               ALL PNT    ALL       C-130     C-141     C-141 PNT
C               -------    -------   -------   -------   ---------
      WRITE(2,*) CCAVG(9), CCAVG(1), CCAVG(12), CCAVG(15), CCAVG(18)
C
C  COLLECT UTILIZATION RATES
C
C                54         89        50       TIS CW     141 IN
C               -------    -------   -------   -------   -------
      WRITE(3,*) RRAVG(3), RRAVG(4), RRAVG(5), CCAVG(22), RRAVG(1)
C
C  COLLECT COMPLETION TIMES
C
C                ALL        C-130      C-141    CW         SL
C               -------    -------   -------   -------   -------
      WRITE(4,*) CCMAX(2), CCMAX(13), CCMAX(16), CCMAX(23), CCMAX(31)
C
C  COLLECT COUNTS BY FY93
C
C                ALL        C-130     C-141      CW         SL
C               -------    -------   -------   -------   -------
      WRITE(8,*) CCNUM(8), CCNUM(14), CCNUM(17), CCNUM(24), CCNUM(32)
C
C  COLLECT WAIT TIMES (ONLY THOSE WHO WAIT)
C
C                 WASH       DP        W/E/A    PAINT     BLDG 89

C               -------    -------   -------   -------   -------
      WRITE(1,*) FFAWT(3), FFAWT(4), FFAWT(5), FFAWT(6), FFAWT(12)
C
C  COLLECT TOTAL WAIT TIMES
C
C                WASH       DP        W/E/A    PAINT     SUM
C               -------    -------   -------   -------   -------
      WRITE(9,*) CCAVG(3), CCAVG(4), CCAVG(5), CCAVG(6), CCAVG(7)
      RETURN
      END
```

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Vita

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REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	March 1992	Master's Thesis

4. TITLE AND SUBTITLE	5. FUNDING NUMBERS
EFFECTS OF FACILITY CONFIGURATIONS AND SCHEDULING TECHNIQUES ON AIRCRAFT THROUGHPUT FOR WARNER ROBINS ALC PAINT/DEPAINT FACILITIES	
6. AUTHOR(S)	
David V. McElveen, Capt, USAF	

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)	8. PERFORMING ORGANIZATION REPORT NUMBER
Air Force Institute of Technology Wright Patterson AFB OH 45433	AFIT/GOR/ENS/92M-19

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSORING/MONITORING AGENCY REPORT NUMBER
USAF/WR-ALC/LJP Warner Robins AFB GA 31098	

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION/AVAILABILITY STATEMENT	12b. DISTRIBUTION CODE
Approved for public release; distribution unlimited	

13. ABSTRACT (Maximum 200 words)

The purpose of this research was to determine the effects of configuration options and dispatching rules on aircraft throughput for the WR-ALC paint/depaint facilities. A simulation mpdel was constructed and used for this analysis as the primary means to conduct the research. The dispatching rules considered were first come first served, largest number in queue, shortest processing time, and a look ahead heuristic.

Due to a reduction in the number of paint aircraft, no configuration option di-fering from the baseline significantly affected aircraft throughput. Dispatching rules were also found to produce no significant differences on aircraft throughput. Configuration options were found to produce significant differences in wait time. Only when the proportion of aircraft requiring paint was increased did the shortest processing time dispatching rule provide significant differences in aircraft wait times.

14. SUBJECT TERMS	15. NUMBER OF PAGES
scheduling, simulation, preemption	288
	16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclassified	Unclassified	Unclassified	UL

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std. Z39-18
298-102